Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

ENERGY CONSERVATION AND OFF-OIL STUDY FOR INSTITUTIONAL BUILDINGS IN NORTHERN SASKATCHEWAN

Canada

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ENERGY CONSERVATION AND OFF-OIL STUDY FOR INSTITUTIONAL BUILDINGS IN NORTHERN SASKATCHEWAN

Prepared for:

Energy, Mines and Resources Canada's
Remote Community Demonstration Program
and
Federal Energy Management Program

Prepared by:

UMA Engineering Ltd.
and
Eneraction Resources Inc.

November 1985

RCDP/PDCE-78

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North Sask Electric Ltd.

Saskatchewan Government Telephones

Saskatchewan Power Corporation

Saskatchewan Parks & Renewable Resources

Various Band, NS and znhRepresentatives.

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LETTER OF TRANSMITTAL

November 22, 1985

Energy Mines & Resources Canada
Conservation and Renewable Energy Office
S.J. Cohen Building, Suite 706
119 Fourth Avenue South
Saskatoon, Saskatchewan
S7K 5X2

Attention: Mr. Grant V. Zackowski, P. Eng.
Head, Energy Program Management
Saskatchewan CREO

Dear Sir

Re: Energy Conservation/Off-Oil Study for Institutional Buildings in Saskatchewan's Remote Communities --Part of the Remote Community Demonstration Program (RCDP)

We are pleased to submit our report titled as referenced above to your office for review and implementation.

The report includes:

- An executive summary - summarizing the scope of the study, a review of the alternate potential energy sources and the potential energy savings that could be achieved with recommended building retrofit measures.
- An introduction - gives the terms of reference for the study, background information and methodology used.
- An alternate fuel resources/technologies chapter that assess the potential of using alternate energy sources for building energy requirements.
- A building assessment for energy conservation measure chapter reviewing current energy usage of 93 institutional buildings in 10 northern Saskatchewan communities and assesses the energy impact and cost benefits of undertaking specific energy conservation retrofit measures.

- A summary and recommendation chapter that highlights, summarizes and comments on the contents of the report and provides recommendations for energy conservation implementation.

It is our hope that this report will provide assistance to the responsible agencies in their energy conservation programs. We would be pleased to assist them in this respect and to respond to any related inquires.

Yours truly

UMA ENGINEERING LTD.

FJMontbriand

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/nd

ÉTUDE SUR LES MESURES D'ÉCONOMIES D'ÉNERGIE ET LES ÉNERGIES DE REMPLACEMENT POUR LES ÉTABLISSEMENTS DES COLLECTIVITÉS ÉLOIGNÉES DE LA SASKATCHEWAN

Résumé

Cette étude examine les énergies de remplacement disponibles et les mesures d'économies de l'énergie pour 93 établissements situés dans 10 collectivités du nord de la Saskatchewan.

La première partie de cette étude porte sur les sources d'énergie utilisables qui comprennent, entre autres: l'énergie solaire, le bois, la tourbe, la gazéification du bois, l'énergie du vent, et la production d'électricité à partir d'une petite centrale hydro-électrique.

La seconde partie de l'étude traite des options de rénovation et des coûts, et fournit les coûts de l'énergie et les épargnes réalisables et recommande des options dont la période de recouvrement ne dépasse pas cinq ans.

SITUATION GÉOGRAPHIQUE DES COLLECTIVITÉS ET DESCRIPTION DES ÉTABLISSEMENTS

Les collectivités sont situées dans la partie septentrionale de la province soit entre le 50ème et le 60ème parallèle. Ces collectivités sont d'ouest en est: Garson Lake, Camsell Portage, Fond-du-Lac, Stony Rapids, Black Lake, Wollaston, Southend, Brabant Lake, Deschambault Lake et Kinoosao. Seulement quatre des dix collectivités sont reliées à l'extérieur par des routes. Les autres collectivités dépendent de chalands, des transports aériens ou de routes d'hiver pour avoir accès à l'extérieur.

L'électricité est produite localement dans toutes ces collectivités à partir de petites usines génératrices diesel mobiles.

Tous les établissements utilisent des systèmes de chauffage alimentés au mazout, à l'exception de deux nouveaux établissements qui font usage du gaz propane. Dans la plupart des installations, on utilise le propane pour cuire les aliments, le mazout pour chauffer l'eau et l'électricité pour sécher les vêtements. Quelques établissements utilisent des chauffe-eau électriques. Un établissement seulement (l'école Brabant) dispose de systèmes de chauffage hybrides bois-mazout qui sont alimentés au mazout seulement.

La liste des établissements comprend des écoles, des cliniques de santé, de petits bureaux (les bureaux du ministère des Parcs et Ressources renouvelables de la Saskatchewan et les bureaux du Conseil de bande), les installations de détachements de la GRC, des salles de réunion, des centres récréatifs, de petites remorques de télécommunications, et des usines génératrices mobiles.

Les organismes fédéraux et provinciaux responsables des établissements sont les suivants:

ÉTABLISSEMENT	FÉDÉRAL	PROVINCIAL
Écoles	Affaires indiennes et du Nord Canada	Écoles du district Northern Lights
Cliniques de santé	Santé et Bien-être social Canada	Ministère de la Santé de la Saskatchewan
Salles du Conseil de bande et bureaux des conseils administratifs locaux (C.A.L.)	Bande et Affaires indiennes et du Nord Canada	Conseils administratifs locaux (C.A.L.)
Parcs et ressources renouvelables (P.R.R.)		Approvisionnements et services de la Saskatchewan
Usine génératrice et édifice du téléphone		La North Saskatchewan Power* et la Sask Tel

En 1984, la consommation totale d'énergie pour les établissements faisant l'objet de cette étude, était de 1 727 443 kW entraînant des déboursés de 585 925 $ et de 261 064 gallons (1,19 millions de litres) de combustible au coût de 464 759 $.

En général, la structure des établissements est de bois, de même que le revêtement extérieur. Les toits sont en pignon. Le vide sanitaire est soit chauffé avec l'isolant posé au périmètre ou non chauffé: les planchers étant isolés seulement. Environ 50% de ces établissements sont des installations préfabriquées et mobiles. Les indices d'isolation des établissements varient de R12 pour les murs à R20 pour les plafonds. En général, les fenêtres sont à double vitrage avec cadre de vinyle et les fuites d'air sont importantes.

Les systèmes de chauffage sont constitués pour la plupart (90%) de fournaises à air chaud alimentées au mazout, de 25 kW environ. Les conduits d'air chaud sont généralement en métal et situés dans le plancher ou dans le vide sanitaire.

Les systèmes de chauffage avec ventilateurs équipés de prises d'air extérieures sont au nombre de sept seulement. Dans certains bâtiments, l'apport d'air frais extérieur est obtenu en enlevant les couvercles des ventilateurs des fournaises, ce qui permet à l'air provenant de l'extérieur d'entrer par le biais des prises d'air de combustion. Des démarches timides sont entreprises pour démolir certains établissements (soit deux écoles et deux cliniques de santé dans les collectivités de Wollaston, Fond-du-Lac, Black Lake et Southend). On a relevé que des rénovations mineures à affectuer sur ces établissements.

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* Une filiale de la Saskatchewan Power Corporation

REVUE DES ÉNERGIES DE REMPLACEMENT DISPONIBLES

Les dispositifs fonctionnant à l'énergie éolienne ou à l'énergie solaire ne sont pas recommandés parce qu'ils ne pourraient répondre aux fortes demandes des jours d'hiver lorsque la température descend sous le point de congélation. Le potentiel qu'offre l'énergie éolienne et solaire est relativement faible durant ces périodes dans les régions septentrionales faisant l'objet de cette étude.

L'utilisation de billots de bois aux fins de chauffage des maisons est largement répandue dans cette région, en raison de sa disponibilité et principalement parce qu'il ne coûte rien. Toutefois, il a été démontré que l'utilisation de billots aux fins de chauffage des établissements n'est pas rentable. Les coûts d'approvisionnement, d'entreposage et de main-d'oeuvre atteignent presque ceux du mazout. Cette possibilité est moins intéressante en raison des coûts et des problèmes d'approvisionnement (fiabilité des sources d'approvisionnement).

Les coûts et les problèmes qu'entraînent l'utilisation des copeaux de bois sont semblables à ceux que présentent l'utilisation des billots de bois.

Plusieurs projets de mini-centrales hydro-électriques ont été envisagés, plus particulièrement concernant Woodcock Rapids situé entre Black Lake et Stony Rapids ainsi que Whitesand Dam situé au sud-ouest de Southend. Toutefois, il a été démontré qu'aucun projet n'est viable économiquement.

Bien que l'utilisation de certaines énergies de remplacement soient possibles sur le plan technique, aucune ne peut remplacer avantageusement le pétrole ou le propane aux coûts actuels. Bref, l'utilisation des énergies de remplacement est soit coûteuse (hydro-électricité), soit coûteuse et techniquement complexe (gazéification du bois) ou peu pratique et pas assez économique (tourbe et billots de bois).

Il a été reconnu que l'emploi de copeaux de bois présente un certain potentiel pour des systèmes de chauffage hybrides semi-automatiques. La nécessité de disposer d'une main-d'oeuvre pour l'approvisionnement et l'écaillage, a suscité la création d'un programme de formation à la gestion et à l'industrie des énergies de remplacement. L'approvisionnement en copeaux de bois des établissements liés par un contrat pourrait être fait par une bande et ce, pour environ 100 $ la corde soit l'équivalent de 0,36 $ le litre de mazout. De nouvelles installations ont été proposées pour les écoles de Wollaston et Black Lake où les coûts actuels du mazout sont dans les 0,45 $ le litre. Ces établissements pourraient faire l'objet de projets de démonstration portant sur l'utilisation de systèmes hybrides copeaux de bois-mazout.

MESURES D'ÉCONOMIES D'ÉNERGIE

Des vérifications énergétiques ont été effectuées dans la plupart des établissements (67 sur 93) soit par la Saskatchewan Power Corporation (29 vérifications énergétiques effectuées) dans le cadre du Programme canadien de vérification du rendement énergétique (P.C.R.E.), soit par le Conseil national de recherches dans le cadre du programme de vérification "HOTCAN"*. En raison de la similitude de quelques établissements, la

*HOTCAN: programme machine qui évalue les pertes de chaleur par simulation.

même vérification énergétique a été utilisée pour deux établissements ou plus.

Les vérifications du P.C.R.E. déterminent habituellement les économies d'énergie réalisables en suggérant une meilleure isolation, la réduction des infiltrations d'air, ou l'amélioration du système d'éclairage. Ces vérifications ne tiennent pas compte, toutefois, des coûts de rénovation et des périodes de recouvrement. Le programme machine "HOTCAN" donne la répartition des pertes d'énergie et établit une comparaison à partir de l'utilisation d'énergie et des coûts avec une maison à haut rendement énergétique ayant les mêmes dimensions et répondant aux normes du programme R-2000.

Dans les établissements où les analyses énergétiques n'avaient pas été effectuées, on a procédé à une répartition des pertes d'énergie.

On a obtenu les plans de la plupart des installation à titre de référence. Une équipe de deux personnes a procédé à une évaluation sur le terrain de chaque établissement afin d'évaluer les possibilités d'application de diverses options de rénovation.

La répartition des mesures de rénovation proposées pour chaque établissement ainsi que les données s'appliquant aux coûts-bénéfices apparaissent au chapitre concernant les relevés des établissements. En outre, un résumé portant sur chaque établissement est aussi présenté.

En plus des options de rénovation suggérées, on a tenu compte des économies possibles de combustible de 215 827 litres de mazout par année (en plus de la quantité d'énergie diesel nécessaire). Les coûts de rénovation sont estimés à 433 092 $.

On a établi la moyenne des coûts de combustible pour l'évaluation des économies et des périodes de recouvrement (à 0,40 $ le litre de mazout et à 0,39 $ le kW d'électricité en chiffres arrondis) pour la région concernée.

Les vingt-trois mesures de rénovation portant sur l'enveloppe du bâtiment, les systèmes électrique et mécanique sont les suivantes:

ENVELOPPE DU BÂTIMENT:

- Ajout d'isolant aux murs extérieurs;
- Ajout d'isolant aux murs intérieurs;
- Ajout d'isolant à l'entre-toit;
- Ajout d'isolant à un toit plat;
- Triple vitrage pour fenêtres à double vitrage;
- Pellicules de vinyle recouvrant les fenêtres;
- Ajout de contre-portes;

- Ajout de joints d'étanchéité autour de la porte;
- Ajout de pare-air étanches dans les vestibules.

SYSTÈMES MÉCANIQUE:

- Ajout de thermostats jour-nuit à maximum et minimum;
- Vérification des échangeurs de chaleur;
- Vérification des prises d'air extérieures du ventilateur (système de chauffage);
- Vérification des conduits d'amenée et d'évacuation de l'air (unités de ventilation);
- Vérification des unités de ventilation;
- Remplacement des chaudières par des fournaises à condensation;
- Remplacement de la commande directe avec poulie des génératrices diesel par une commande à embrayage électrique.

SYSTÈME ÉLECTRIQUE:

- Remplacement des lampes fluorescentes par des lampes à ampoules écono-watt;
- Remplacement des lampes fluorescentes et des ballasts par des appareils efficaces en énergie;
- Remplacement des douilles pour lampes incandescentes par des douilles pour lampes fluorescentes;
- Remplacement des lampes incandescentes par des lampes fluorescentes;
- Remplacement des lampes incandescentes à l'extérieur par des lampes à vapeur de sodium;
- Remplacement de lampes incandescentes à l'extérieur (PAR 150) par des lampes à vapeur de sodium.
- Remplacement des lampes extérieures à vapeur de mercure par des lampes de sodium à haute pression.

Cette étude a été entreprise par la UMA Engineering Ltd. de Saskatoon en collaboration avec ENERACTION Resources Inc. de Regina pour le Programme de démonstration dans les collectivités éloignées et le Programme fédéral de gestion de l'énergie d'Énergie, Mines et Ressources CANADA.

1.0 EXECUTIVE SUMMARY

1.1 Introduction

This Study entitled "Energy Conservation/Off Oil Study for Institutional Buildings in Saskatchewan Remote Communities" examines alternate energy sources and energy conservation measures for ninety-three buildings in ten northern Saskatchewan communities.

The Report assesses the potential for alternate energy use in one part and the energy conservation measures that could, through retrofitting and operation, reduce oil consumption in the second part.

The alternate energy sources reviewed included the possible use of solar energy, wood, peat, wood gasification, wind generation and small scale hydro power generation. Consideration of small scale nuclear power was omitted because of lack of technical and cost information.

The second part deals with energy conservation measures, identifying viable retrofit options for the category of buildings investigated, and which options are applicable for the respective buildings based on a five year payback or less. It further identifies the retrofit costs, annual energy and energy cost savings for the recommended retrofit measures. This information is summarized and presented in the summary chapter.

1.2 Description of Communities' Locations and Buildings Investigated

The communities of the facilities studied are in the northern half of the province between the 50th and 60th parallel and include from west to east: Garson Lake, Camsell Portage, Fond du Lac, Stony Rapids, Black Lake, Wollaston Lake, Southend, Brabant Lake, Deschambault Lake and Kinoosao. Of the ten communities, only four are serviced with outside connecting roads. The other rely on barge, air transportation or winter roads for outer access.

Electrical power in all of these communities is locally generated with small portable type diesel generating plants.

All of the institutional buildings use fuel oil fired heating systems with the exception of three new ones which use propane gas. Most of the facilities use propane for cooking stoves, oil for water heating and electrical heat for clothes drying. Some buildings use electric water heaters. Only one facility (Brabant School) has dual wood/oil fired furnaces which have been fired with oil only.

The institutional buildings include schools, health clinics, small office (Resources and Band offices), R.C.M.P. detachment facilities, assembly halls, recreation facilities and small telecommunication trailers and portable type power plants.

The agencies responsible for the buildings include both Federal and Provincial Departments as follows:

Building	Federal	Provincial
Schools	D.I.A.N.D.	Northern Lights School Division
Health Clinics	Health and Welfare Canada	Saskatchewan Health
Band Halls and	Band & (DIAND)	
NH/NS offices and Halls		NH/NS, Sask. Urban Affairs
Saskatchewan Parks and Renewable Resources (PRR)		Saskatchewan Supply and Services
Power Plant		North Sask Electric Ltd.
Telephone Building		Sask Tel

The total 1984 energy consumption for the buildings investigated was 1,727,443 kW of power costing $585,925 and 261,064 gallons (1.19 ML) of heating fuel costing $464,759.

Construction of the buildings consisted mainly of wood frame and sided structures with gable truss roofs and crawl spaces either heated with perimeter insulation or non-heated with insulated floors. Approximately 50% of the buildings are assembled from prefabricated portable units. The buildings are generally insulated to RS12.1 walls and RS13.5 ceilings standards. Windows are generally double glazed vinyl slider type with sigificant air leakage.

Heating systems are predominantly (90%) oil fired hot air furnaces, 25KW size range and numerouly used in larger buildings. Hot air distribution is generally by metal duct system located in the floor or crawl space.

Very few of the heating systems (7) are equipped with mixed return/outside air ventilation systems. Some rely on fresh air by removing the furnace fan covers and permitting drawing in of outside air through the combustion air inlets.

Some of the buildings (two schools and two health clinics) are tentatively slated for replacement (Wollaston, Fond du Lac, Black Lake, and Southend respectively). These were evaluated for minor retrofits only.

1.3 Review of Alternate Energy Sources

Free energy from solar and wind devices were suggested as inadequate because they would not function when needed most, i.e., mid-winter during extreme sub-zero temperatures. Winds and solar energy potential were found to be relatively low during these periods in the northern latitudes of the study area.

Chunk wood is readily available and used extensively for home heating throughout the study area because it is mainly free for the labour. However, it has not been demonstrated viable for institutional utilization. The cost of supplying, storing, feeding and residual removal appears close to that of oil. This cost associated with, and the problems of, supply management (supply reliability) and encumbrance of the system weigh against this alternative.

The chipped wood option is faced with similar costs and management problems as the chunk wood alternative involved in the supply, chipping, storing, delivery, charging and residual removal.

A demonstration program of chip wood/oil dual fired furnaces is suggested in the recommendations.

Several mini-hydro prospects have been identified in the study, i.e., Woodcock Rapids between Black Lake and Stony Rapids and Whitesand Dam southwest of Southend as examples, however, none have been demonstrated to be economically viable.

Although some of the alternate energy alternatives are identified as technically feasible, none are identified as offering a convenient viable alternative to oil or propane fuels presently being used throughout the study area on the basis of present day costs. The possible development of a wood chip co-operative supply system for labour and management training for providing fuel to dual fuel institutional furnaces is reviewed in the summary section.

1.4 Energy Conservation Measures

Twenty-three (23) retrofits involving building envelope, mechanical and electrical system upgrading measures for the conservation of heat and electrical energy were identified on a unit basis, i.e., per furnace or per square metre basis, etc., and presented in a data sheet format.

The identified retrofit measures include the following:

	Building Envelope	Mechanical System	Electrical System
1.	Add Insulation to Exterior Walls		
2.	Add Insulation to Interior Walls		
3.	Add Attic Insulation		
4.	Add Flat Roof Insulation		

Building Envelope	Mechanical System	Electrical System
5. Triple Glaze Existing Double Glazed Windows		
6. Vinyl Film Seal over Windows		
7. Add Storm Door		
8. Add Door Weatherstripping and Sweep		
9. Add Vestibule Air Lock		
	10. Add Temperature Setback Thermostats	
	11. Revised Entrance Heating Outlets	
	12. Outside Air Control System Ventilation (furnaces)	
	13. Mixed Air Control System (Ventilation units)	
	14. Ventilation Unit Fan Control	
	15. Furnace Replacement with Condensing Furnaces	
		16. Flourescent Lamp Replacement with Econo-Watt Type Lamps
		17. Fluorescent Lamp and Ballast Replacement with Energy Efficient Units

Building Envelope	Mechanical System	Electrical System
		18. Replace Socket Incandescent with Socket Fluorescent
		19. Replace Incandescent with Fluorescent Fixtures
		20. Replace Exterior Incandescent with Sodium Vapour
		21. Change Exterior Par 150 Incandescent to Sodium Vapour
		22. Change Exterior MV to HPS Lamps
	23. Convert Diesel Generator Direct Drive Sheave to Electric Clutch	

The retrofit costs and the energy savings in terms of fuel and dollars and payback periods were identified for the respective options. Some of these had lengthy payback periods, i.e., greater than ten years, which were presented for information purposes. The retrofit data sheets were used in the building assessment reviews for identifying potential energy savings and retrofit costs for undertaking certain identified conservation measures. The retrofit costs (development shown) were taken for average northern conditions and not site specific to any one location.

The fuel costs used in the cost savings and payback determinations were rounded averaged figures for the study area ($.40/L oil and $.39/kW for power).

1.5 Building Assessments

Most of the buildings (67 of the 93) had prior energy audits performed either by Saskatchewan Power Corporation (29) under the Enersave[1] Mobile Energy Audits or by the National Research Council Hot Can Audits (38). Some of the structures were duplicates where one audit served two or more buildings.

The CEAP Audits in most cases identified what energy reduction and fuel cost saving could be achieved through implementation of certain insulation upgradings, exhaust volume reductions and lighting fixture changes without consideration for the retrofit costs and payback periods. The Hot Can Audits provide a calculated energy loss breakdown and compared this to the energy use and cost of an equivalent size Super Energy Efficient Home (SEEH) finished to the R2000 standard.

Those without energy audits were analyzed for energy loss breakdown.

Construction drawings of most of the major facilities were secured for reference purposes. An on-site examination of each building was undertaken by a two-man team for building and system familiarization to assess applicability of various retrofit options. The identified retrofit options either from the Enersave Studies and/or on-site assessments were then summarized in a building summary report. These reports reviewed the present energy consumption rates, identified potential savings by undertaking certain retrofits, the costs and paybacks of undertaking such retrofits, and indicated the respective payback periods. A separate Building Summary was prepared for each building and summarized in the summary and recommendations chapter.

1.6 Summary and Recommendations

The summary and recommendations are presented in two parts; one reviewing the alternate energy sources and the second dealing with energy conservation measures.

---

(1) Performed Under
Canada Energy Audit Program (CEAP)

1.7 Alternate Energy Sources

The technical feasibility of using alternate energy sources is confirmed for chunk wood, wood chip, wood gasification and small scale hydro. However, it is identified that none of these options by themselves has been judged to be economically viable to the currently used fuel oil or propane for the institutional facilities studied. The alternates were identified as costly (hydro), costly and technically complicated (wood gasification) or inconvenient, and not economical enough to encourage its use (peat and chunk wood).

Wood chip was identified as having some potential for relatively automated dual firing application and, because of the manpower management for feed stock procurement and chipping operation, it lends itself to an alternate fuel industry and management training program in the form of a Band operated facility supplying wood chips to institutional faciliities under Contract for approximately $100/equivalent cord or $.36/L equivalent oil price. New school facilities are being proposed for Wollaston and Black Lake where current fuel costs are in the $.45/L range. These could be considered for dual fired wood chip/oil demonstration projects.

1.8 Energy Conservation Measures

Twenty-three retrofit measures were considered for the ninety-six institutional buildings in ten northern Saskatchewan communities. A breakdown showing the proposed retrofit measures for each building together with cost benefit data is noted in the building survey chapter and a summary for each building is presented in the summary chapter.

A potential energy saving of 215,827 gallons (981,171 L) per year (including diesel power generation allowance) worth has been identified with the retrofit options suggested. The retrofit costs are estimated at 433,092 dollars.

The Report is arranged so that the Chapters, Introduction, Energy Conservation Measures and Building Assessments can be excerpted in whole or in part for mini-reports for the responsible agencies for the respective institutional buildings to assist in their energy conservation programs.

2.0 INTRODUCTION

2.1 General

The Department of Energy Mines and Resources Canada is promoting energy conservation off-oil studies and programs throughout Canada.

This study was commissioned as part of this program to investigate the use of alternate energy sources and conservation measures for buildings in remotely located communities in Northern Saskatchewan.

The highest energy users and consequently highest petroleum based fuel consumers in these communities are the institutional buildings over which the local populace has little or no control.

The purpose of this study is to inspire and aid the agencies responsible for the overall provision, operation and maintenance of these institutions in the implementation of energy conservation measures to decrease the dependence of these institutions on fossil fuels (through energy conservation) and where viable promote replacement of presently used energy sources with locally available renewable and non-renewable resources.

2.2 Facilities Studied

The study includes the review of 93 institutional buildings in 10 northern Communities as follows:

Table 2.1

List of Institutional Facilities

In Northern Saskatchewan

Assessed for Energy Conservation

Off Oil Alternate Fuel Opportunities

Black Lake

Building	Approximate Size	Responsible Agency *
4 Teacherages	555 sq.m. Total	DIAND
School - Federal	1195 sq.m.	DIAND
Health Clinic	185 sq.m.	HWC
Band Office	115 sq.m.	Band
Band Hall	209 sq.m.	Band
Sask Tel	18 sq.m.	Sask Tel

Brabant Lake

Building	Approximate Size	Responsible Agency *
DNS Construction/ Warehouse(Now N.S. Office/Warehouse)	109 sq. m	NS Brabant Lake
School - provincial	770 sq. m	Sask.Ed.
Teacherages	197 sq. m.	Sask.Ed.
Radio Building, Sask Tel		Sask Tel

Camsell Portage

Building	Approximate Size	Responsible Agency *
North-Sask Electric Power Plant		SPC
School- provincial	191 sq.m.	Sask.Ed.
PRR Building	44 sq.m.	S.S./PRR
Teacherage	60 sq.m.	Sask.Ed.

Deschambault Lake

Building	Approximate Size	Responsible Agency *
School - provincial	2234 sq.m.	Sask.Ed.
Teacherages (3)	493 sq.m.	Sask.Ed.
Community Hall	173 sq.m.	N.H.Deschambault Lake
R.C.M.P.	27 sq.m.	RCMP
Band Office	98 sq.m.	Band
Community Rink	2009 sq.m.	N.H.Deschambault Lake
North-Sask Electric Gen Building		SPC
Health Clinic	172 sq.m.	HWC

Fond du Lac

Band Office, Band Hall	447 sq. m	Band/HWC
Clinic(all in one Bldg)	294 sq.m.	
Classrooms (3 portables)		
School - federal	1370 sq. m	DIAND
Mini Gym	196 sq.m.	
Storage	71 sq. m	Band
Teacherages (5 buildings)	572 sq. m	Band DIAND
H & W Residence (Under Construction)	371 sq. m	HWC
Sask Tel	46 sq. m	Sask Tel

Garson Lake

School - provincial (2 - buildings)	179 sq. m	Sask.Ed.
Teacherage	56 sq.m.	Sask.Ed.

Kinoosao

Resources Office - PRR	53 sq. m	S.S./PRR
School - provincial	178 sq. m	Sask Ed.
Hall (Demolished)		
North-Sask Electric Building	94 sq. m	SPC
Teacherage	89 sq.m.	Sask.Ed.

Southend

Two schools & 2 portables	2159 sq. m	Fed./Prov.
Teacherages (2 buildings)	401 sq. m	DIAND
Community Hall N.H.	131 sq.m.	NH Southend
Sask Tel	36 sq. m	Sask Tel
North-Sask Electric		SPC
PRR Warehouse & PRR Resource	177 sq. m	S.S./PRR
Recreation Complex	1615 sq. m	Band
Health Clinic	214 sq. m	HWC
Band Office	111 sq.m.	Band
(NH) Office	48 sq.m.	NH Southend

Stony Rapids

School - provincial	1369 sq. m	Sask.Ed.
Health Clinic	337 sq. m	HWC
Resources Office - PRR	89 sq. m	PRR
(LAC) Office & Fire Hall (1 building)	124 sq. m	NS Stony Rapids
Community Hall	458 sq. m	NS Stony Rapids
R.C.M.P.	288 sq. m.	RCMP
Teacherages (2)	153 sq. m.	Sask.Ed.

Wollaston

Band Hall	260 sq. m	Band
Band Office	76 sq. m	Band
School provincial (5 buildings)	1111 sq. m	Sask.Ed.
PRR Office	75 sq. m	SS/PRR
Community College	227 sq. m	Sask.Ed.
R.C.M.P. (2 buildings)	100 sq. m	RCMP
Lac Hall & Office	179 sq. m	NSWollaston
H & W Clinic & Residence	739 sq. m	HWC
Teacherages (6 units)	414 sq.m.	Sask.Ed.

* DIAND - Dept. of Indian Affairs and Northern Development
HWC - Health and Welfare Canada
PRR - Saskatchewan Parks & Renewable Resources
SUA - Saskatchewan Department of Urban Affairs
Sask.Ed. - Saskatchewan Department of Education
(Northern Lights School Division)
SPC - Saskatchewan Power Corporation
S.S. - Saskatchewan Supply & Services
NH - Northern Hamlet, formerly LCA
NS- Northern Settlement, formerly LAC

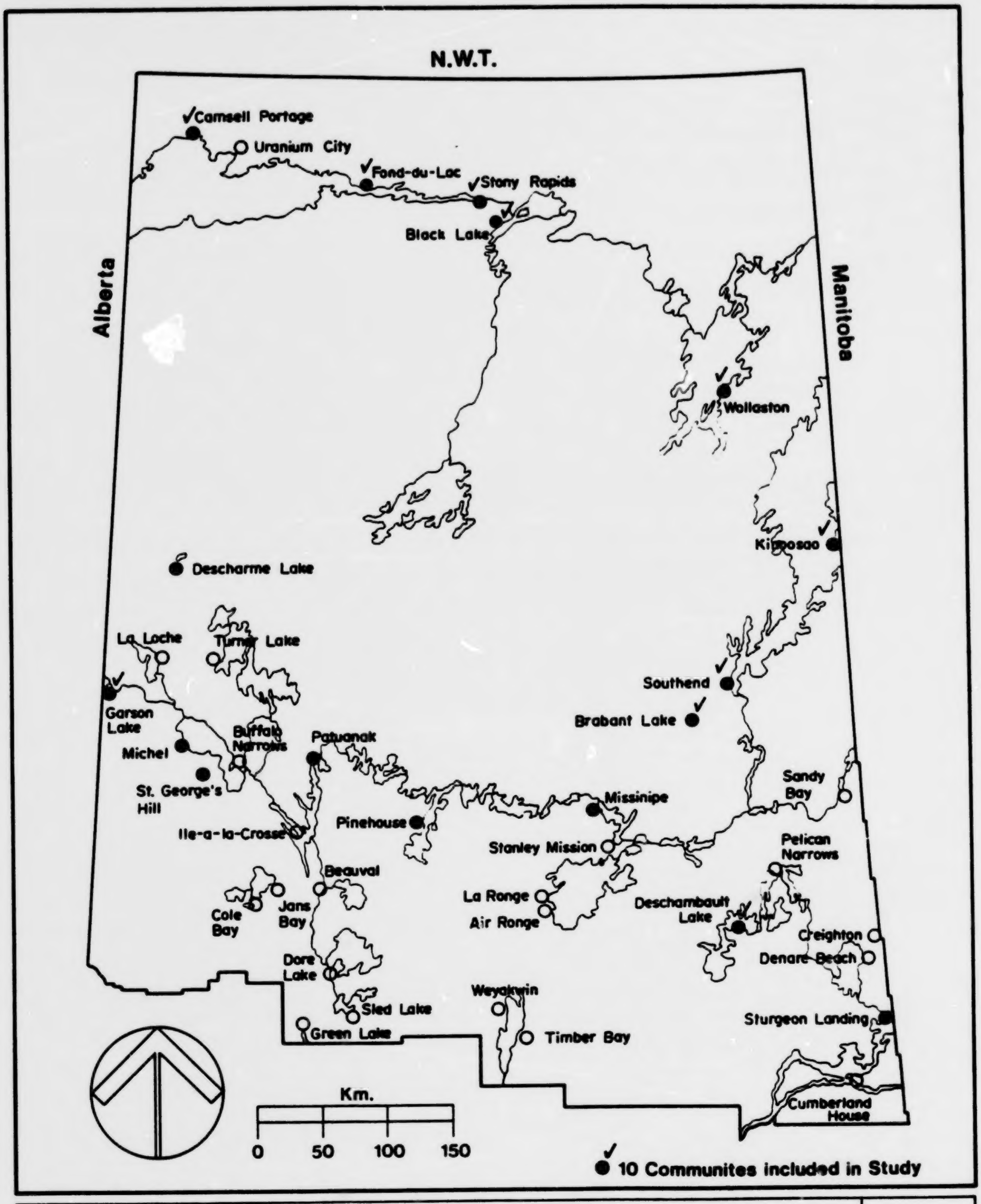
The location of the respective communities is illustrated on the following plan showing the Northern Administration District and those included in this study.

Site plans of each listed community follows which show respective locations of the studied buildings within the respective communities.

Of the ten communities, only four are serviced with outside connecting roads. The others rely on barge, air transportation or winter roads for outer access.

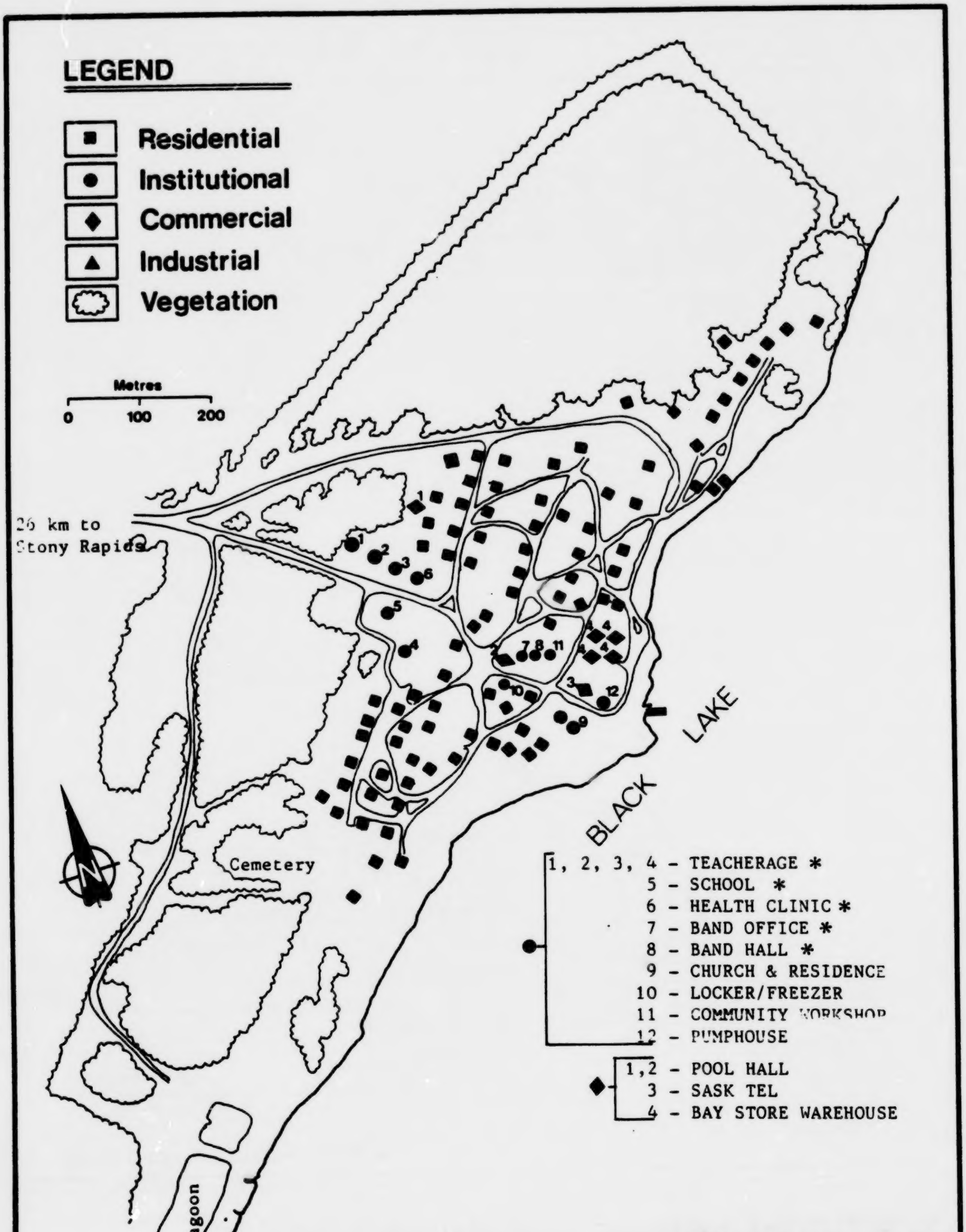
Electrical power in all of these communities is locally generated with small portable type diesel generating plants.

All of the institutional building use fuel oil fired heating systems with the exception of three new ones which use propane gas. Most of the facilities use propane for cooking stoves, oil for water heating and electrical heat for clothes drying. Some building use electric water heaters. Only one facility (Brabant School) has dual wood/oil fired furnaces which have been fired with oil only.

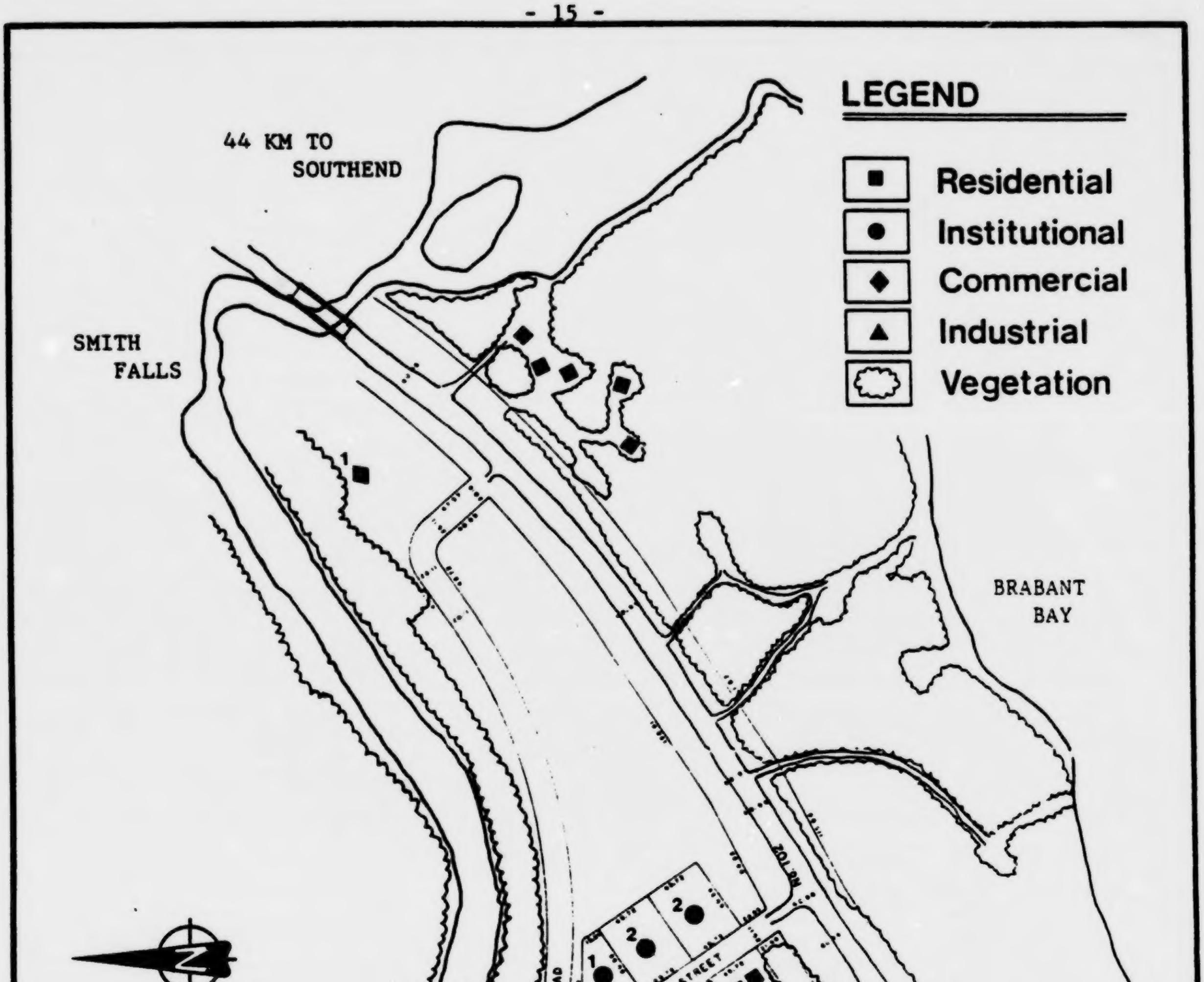

N.W.T.
Alberta
Manitoba
✓Camsell Portage
Uranium City
✓Fond-du-Lac
✓Stony Rapids
Black Lake
Wollaston
Kinoosao
Descharme Lake
La Loche
Turnor Lake
Garson Lake
Michel
Buffalo Narrows
Patuanak
St. George's Hill
Ile-a-la-Crosse
Pinehouse
Missinipe
Southend
Brabant Lake
Sandy Bay
Stanley Mission
Pelican Narrows
Beauval
Cole Bay
Jans Bay
La Ronge
Air Ronge
Deschambault Lake
Creighton
Denare Beach
Dore Lake
Weyakwin
Sled Lake
Green Lake
Timber Bay
Sturgeon Landing
Cumberland House
Km.
0
50
100
150
✓● 10 Communites included in Study

NORTHERN ADMINISTRATION DISTRICT
Urban Centres, L.C.A.'s, L.A.C.'s & (Settlement Areas)

1

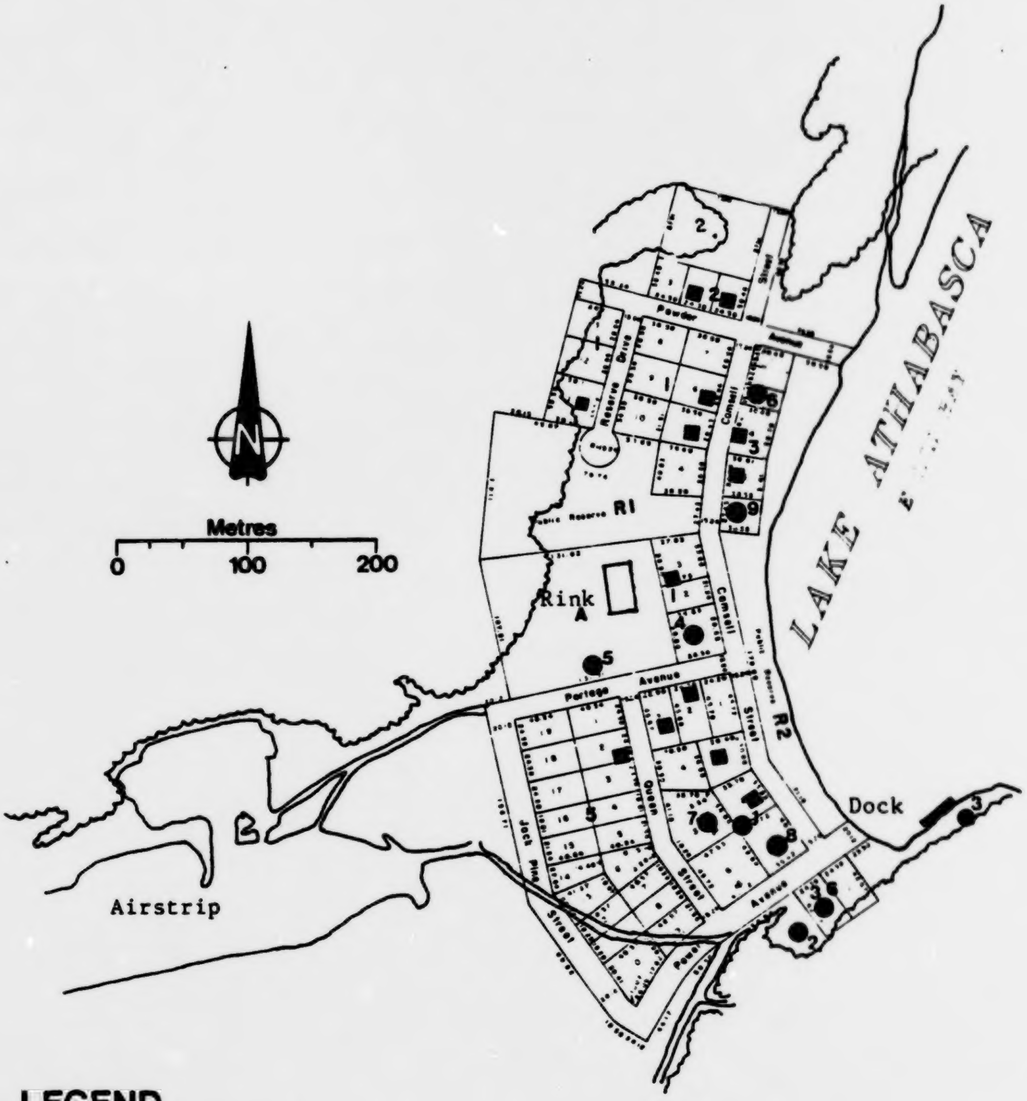

LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
Metres
0
100
200
26 km to
Stony Rapids
Cemetery
Lagoon
BLACK LAKE
1, 2, 3, 4 - TEACHERAGE *
5 - SCHOOL *
6 - HEALTH CLINIC *
7 - BAND OFFICE *
8 - BAND HALL *
9 - CHURCH & RESIDENCE
10 - LOCKER/FREEZER
11 - COMMUNITY WORKSHOP
12 - PUMPHOUSE
1,2 - POOL HALL
3 - SASK TEL
4 - BAY STORE WAREHOUSE
Black Lake

SOURCE: COMMUNITY PLANNING STUDY - HFW 78-80 - HELMUTH KNAUS - DIAND


LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
44 KM TO SOUTHEND
SMITH FALLS
BRABANT BAY
174 KM TO LA RONGE
WADDY RIVER
ROAD
CATLING STREET
STREET
Metres
0
100
200
1 LAC OFFICE & WAREHOUSE *
2 NORTH-SASK ELECTRIC * POWER & TRANSMITTERS
3 NEW SCHOOL *
4 TEACHERAGE *
◆-1, BRABANT LAKE CAMP -

Brabant Lake

SOURCE: 1:5000/1981 AIR PHOTOS - DNS COMMUNITY PLANNING PLANS & FIELD NOTES 79-80.


N
Metres
0
100
200
LAKE ATHABASCA
Rink
R1
R2
Dock
Airstrip
Powder Avenue
Reserve Drive
Camsell Street
Portage Avenue
Queen Street
Jack Pine Street
Public Reserve
1
2
3
4
5
6
7
8
9

LEGEND

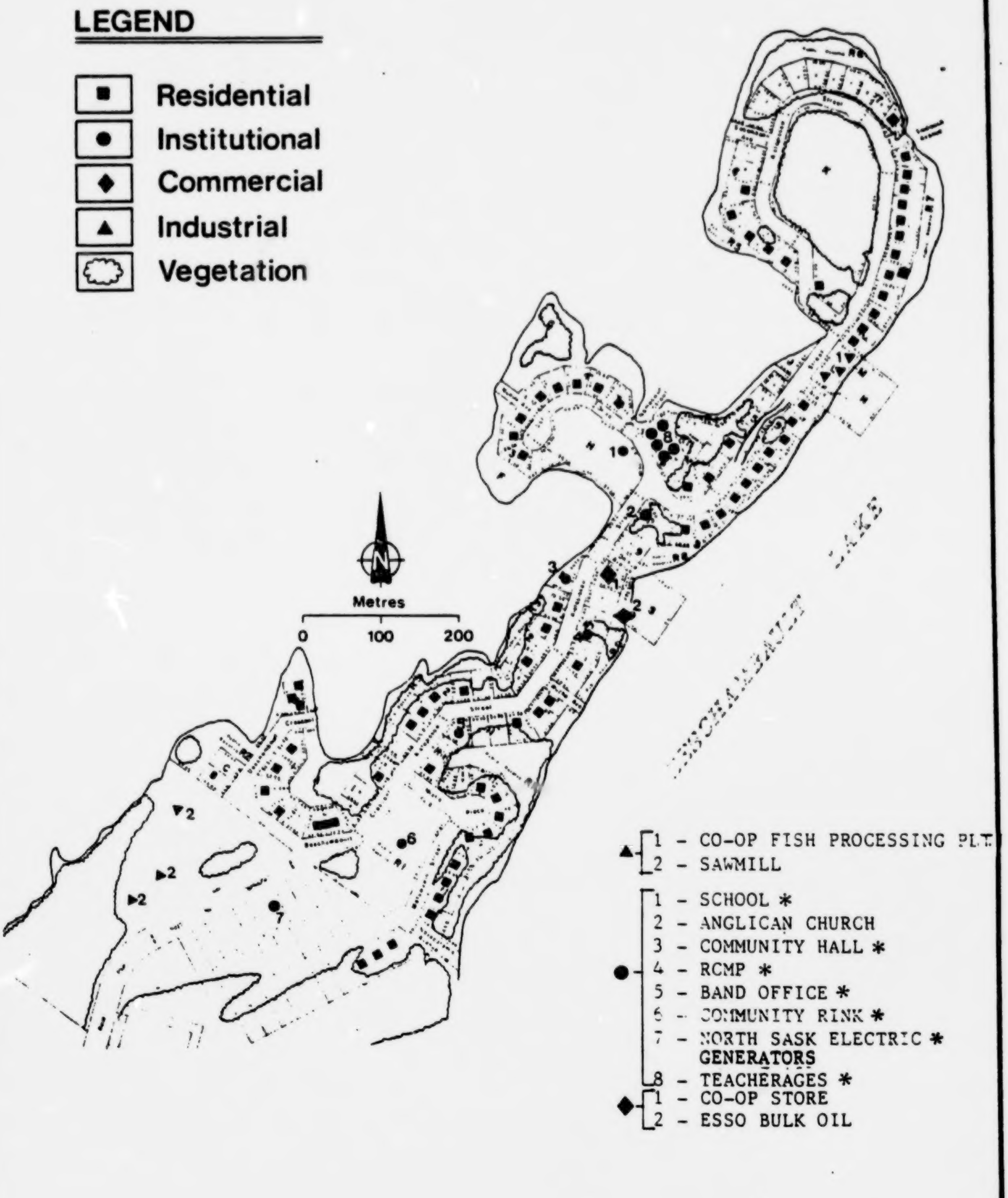
- ■ Residential
- ● Institutional
- ◆ Commercial
- ▲ Industrial
- ☁ Vegetation

●

1 - PUMPHOUSE
2 - NORTH SASK ELECTRIC POWER PLANT *
3 - STORAGE
4 - LOG CHURCH
5 - SCHOOL *
6 - PUMPHOUSE
7 - OLD HUDSON BAY STORE
8 - DNS *
9 - TEACHERAGE *

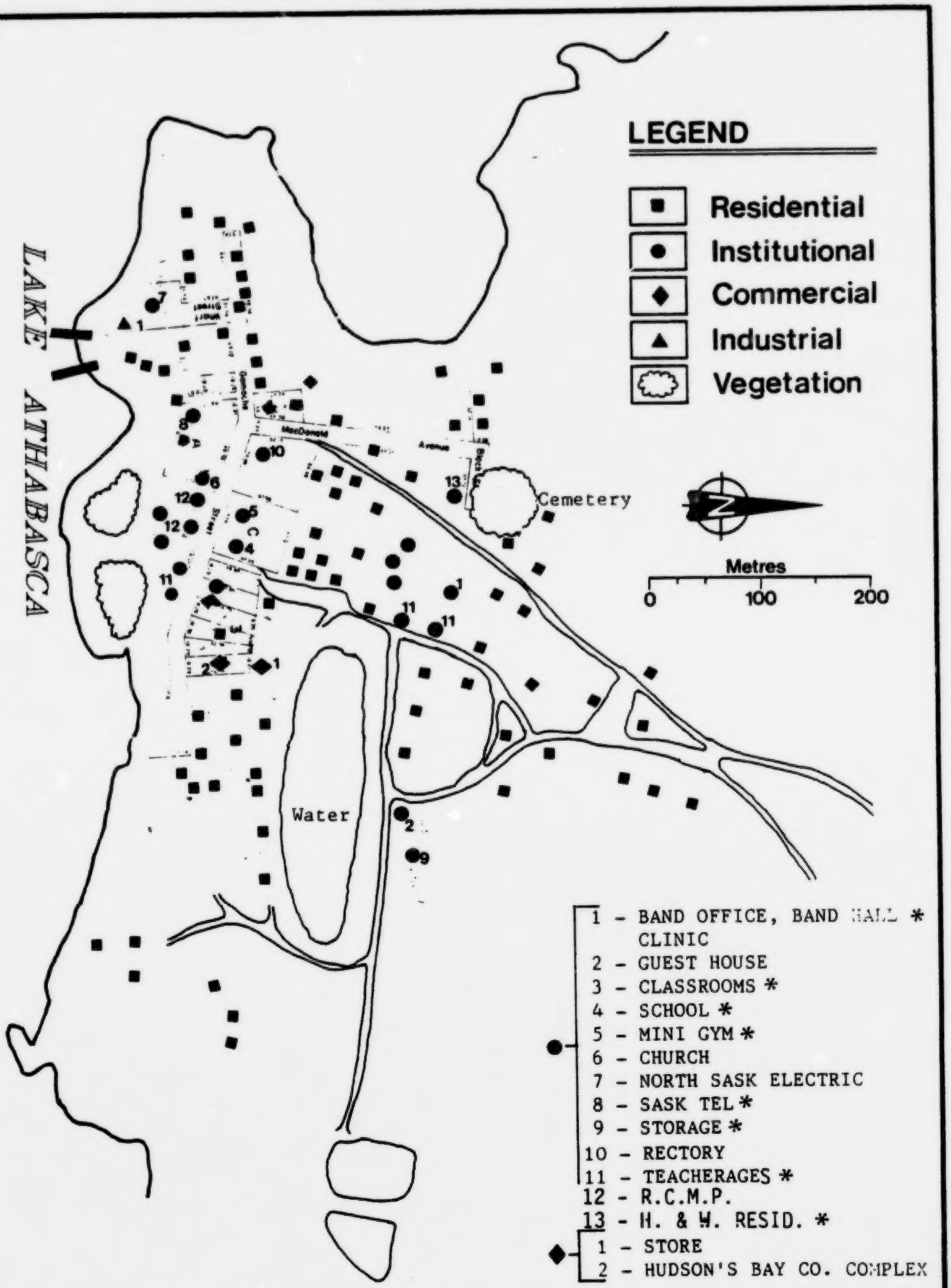
Camsell Portage

SOURCE: 1:5000 AIR PHOTO'S 1981 DNS COMMUNITY PLANNING FIELD NOTES & LEGAL PLANS 1979


LEGEND
Residential
Institutional
Commercial
Industrial
Vegetation
N
Metres
0
100
200
DESCHAMBAULT LAKE
▲ 1 - CO-OP FISH PROCESSING PLT
2 - SAWMILL
● 1 - SCHOOL *
2 - ANGLICAN CHURCH
3 - COMMUNITY HALL *
4 - RCMP *
5 - BAND OFFICE *
6 - COMMUNITY RINK *
7 - NORTH SASK ELECTRIC * GENERATORS
8 - TEACHERAGES *
◆ 1 - CO-OP STORE
2 - ESSO BULK OIL

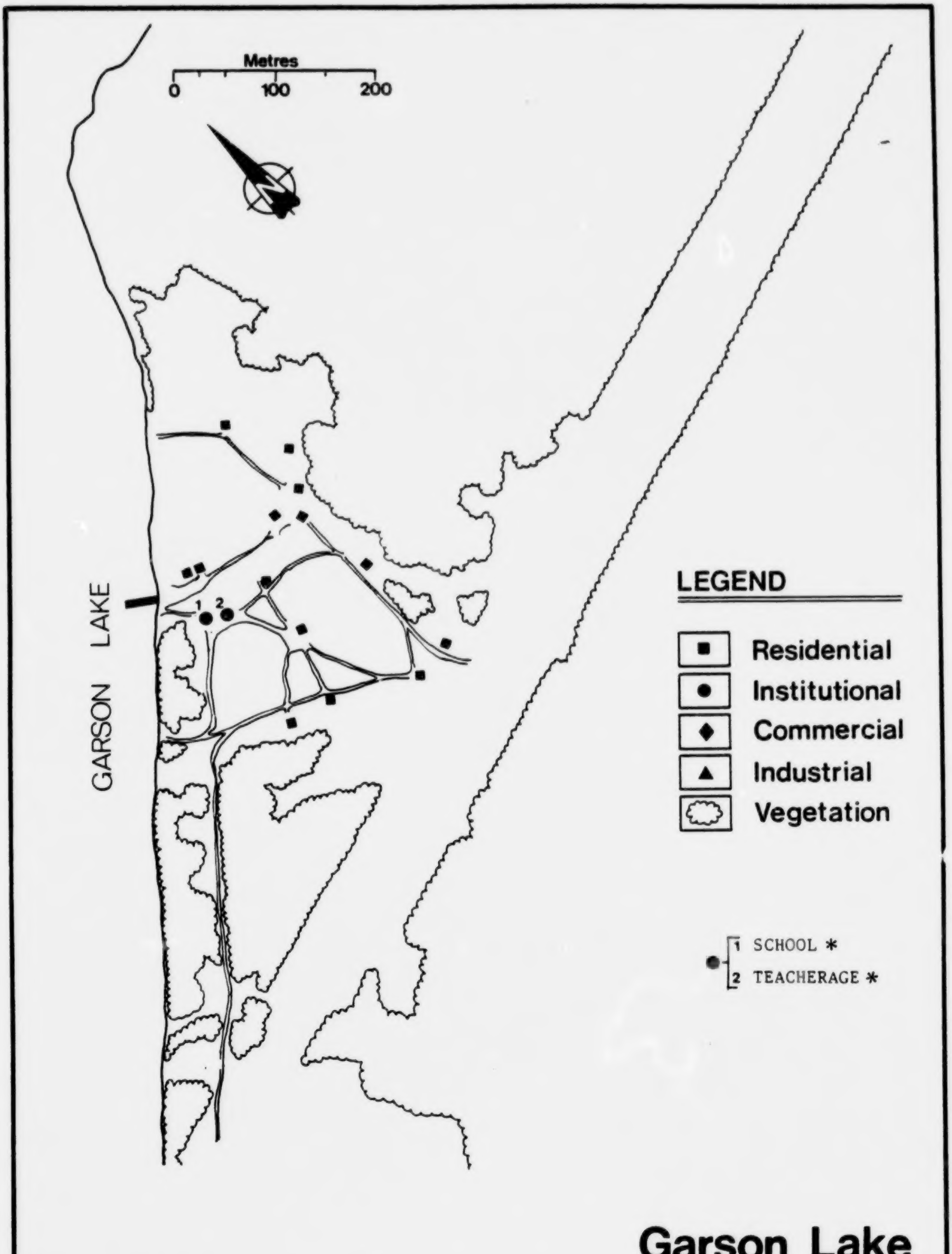
Deschambault Lake

SOURCE: 1:5000 AIR PHOTO'S 1981 DNS COMMUNITY PLANNING FIELD NOTES & LEGAL PLANS-1979


LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
LAKE ATHABASCA
Water
Cemetery
MacDonald
Avenue
Street
Metres
0
100
200
1 - BAND OFFICE, BAND HALL *
CLINIC
2 - GUEST HOUSE
3 - CLASSROOMS *
4 - SCHOOL *
5 - MINI GYM *
6 - CHURCH
7 - NORTH SASK ELECTRIC
8 - SASK TEL *
9 - STORAGE *
10 - RECTORY
11 - TEACHERAGES *
12 - R.C.M.P.
13 - H. & W. RESID. *
1 - STORE
2 - HUDSON'S BAY CO. COMPLEX

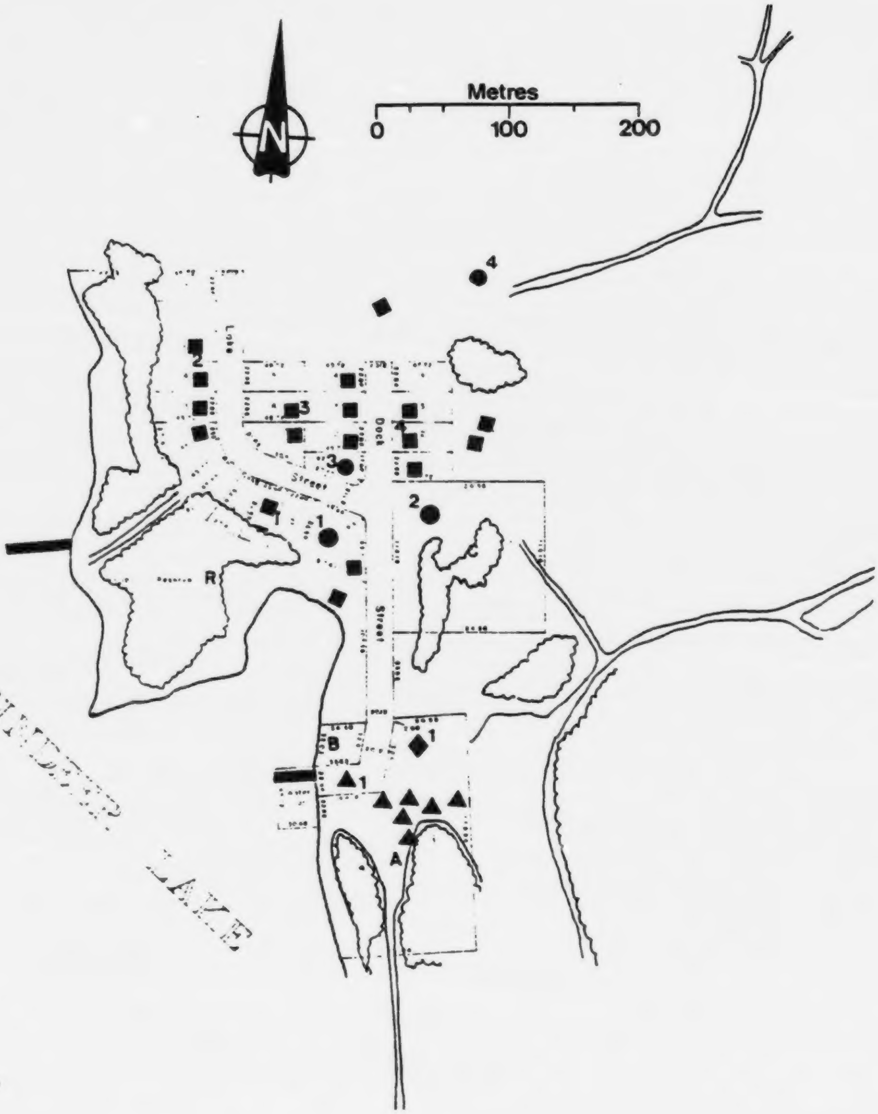
Fond du Lac

Source: 1:5000 Air Photo's June 1981, DNS Community Planning Plans 79


Metres
0
100
200
GARSON LAKE
1
2
LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
1 SCHOOL *
2 TEACHERAGE *

Garson Lake

SOURCE:: 1:5000 AIR PHOTO'S 1979


N
Metres
0
100
200
Lobe
Dock
Street
Street
R
B
A
REINDEER LAKE

LEGEND

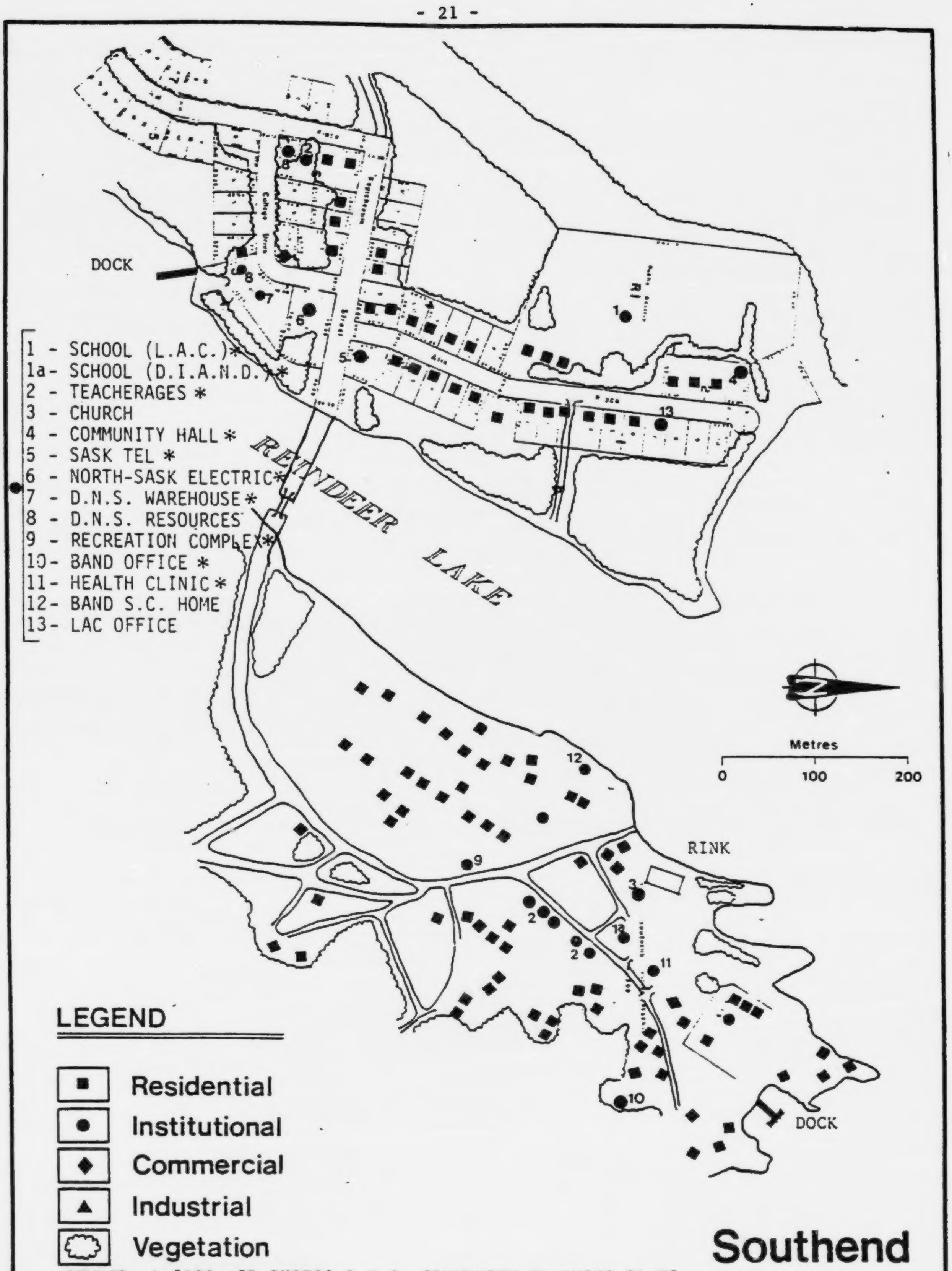
■ Residential
● Institutional
◆ Commercial
▲ Industrial
☁ Vegetation

● 1 RESOURCE OFFICE *
2 SCHOOL *
3 HALL *
4 NORTH SASK ELECTRIC *

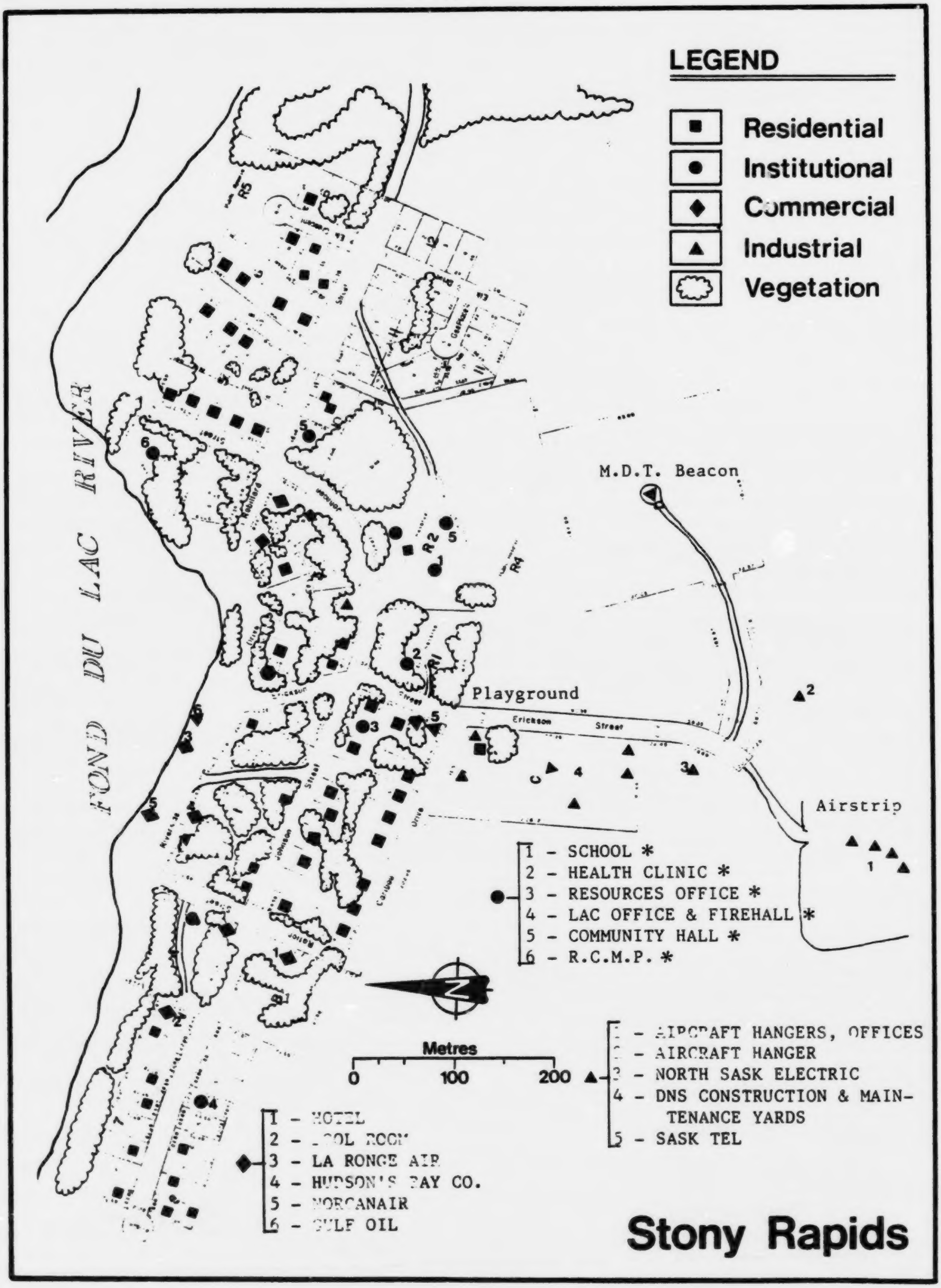
▲ 1 CO-OP STORE
2 CO-OP FISHERIES

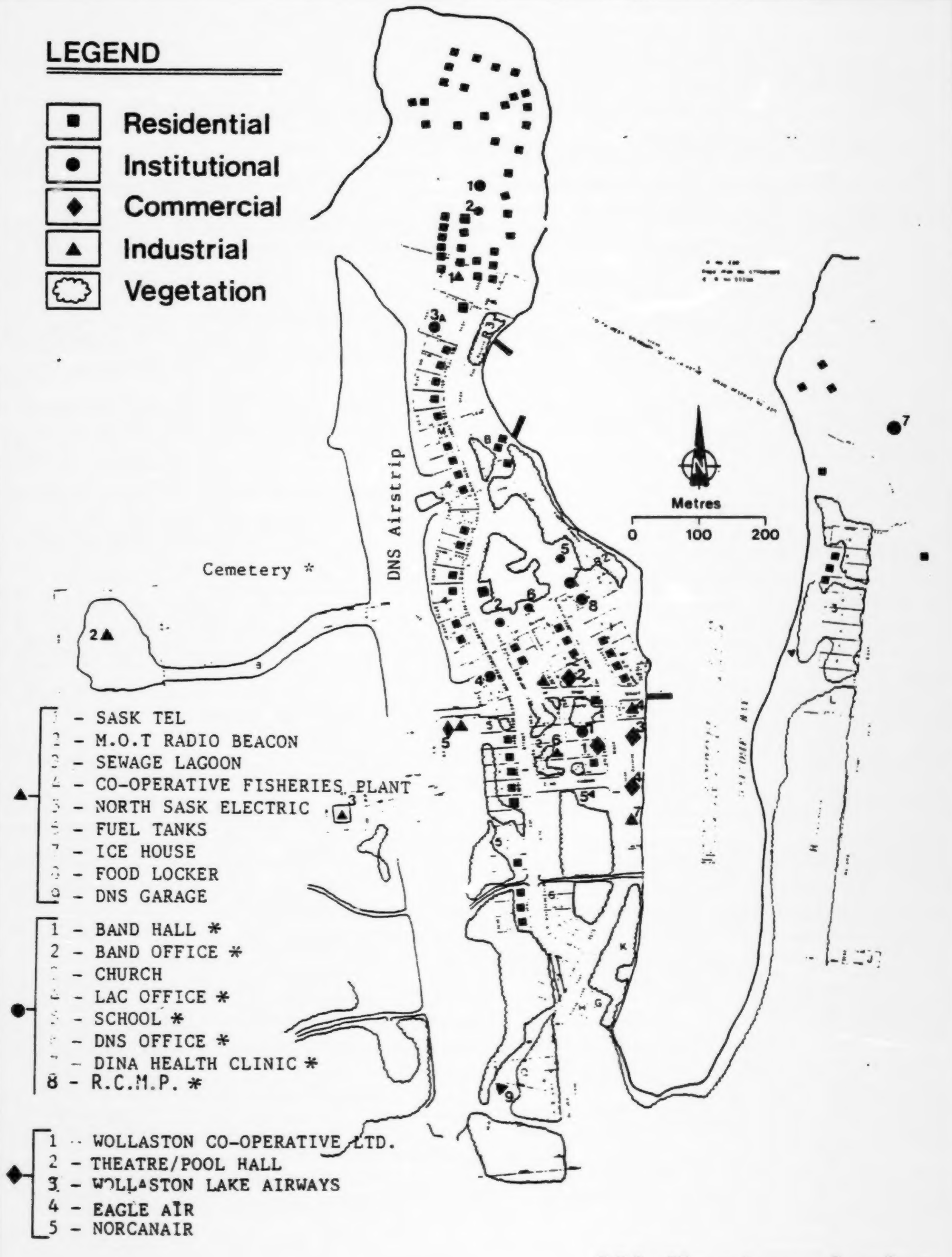
Kinoosao

SOURCE: 1:5000 AIR PHOTO'S JUNE 81 LEGAL PLAN - DNS COMMUNITY PLANNING 1975


DOCK
1 - SCHOOL (L.A.C.)*
1a- SCHOOL (D.I.A.N.D.)*
2 - TEACHERAGES *
3 - CHURCH
4 - COMMUNITY HALL *
5 - SASK TEL *
6 - NORTH-SASK ELECTRIC*
7 - D.N.S. WAREHOUSE *
8 - D.N.S. RESOURCES
9 - RECREATION COMPLEX*
10- BAND OFFICE *
11- HEALTH CLINIC *
12- BAND S.C. HOME
13- LAC OFFICE
REINDEER LAKE
Metres
0
100
200
RINK
DOCK
LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
Southend

SOURCE: 1:5000 AIR PHOTOS D.N.S. COMMUNITY PLANNING PLANS


LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
FOND DU LAC RIVER
M.D.T. Beacon
Playground
Erickson Street
Airstrip
● 1 - SCHOOL *
2 - HEALTH CLINIC *
3 - RESOURCES OFFICE *
4 - LAC OFFICE & FIREHALL *
5 - COMMUNITY HALL *
6 - R.C.M.P. *
▲ 1 - AIRCRAFT HANGERS, OFFICES
2 - AIRCRAFT HANGER
3 - NORTH SASK ELECTRIC
4 - DNS CONSTRUCTION & MAINTENANCE YARDS
5 - SASK TEL
◆ 1 - HOTEL
2 - POOL ROOM
3 - LA RONGE AIR
4 - HUDSON'S BAY CO.
5 - NORCANAIR
6 - GULF OIL
Metres
0
100
200
N
R5
R2
R4
Stony Rapids


LEGEND
■ Residential
● Institutional
◆ Commercial
▲ Industrial
Vegetation
Metres
0 100 200
N
DNS Airstrip
Cemetery *
▲
1 - SASK TEL
2 - M.O.T RADIO BEACON
3 - SEWAGE LAGOON
4 - CO-OPERATIVE FISHERIES PLANT
5 - NORTH SASK ELECTRIC
6 - FUEL TANKS
7 - ICE HOUSE
8 - FOOD LOCKER
9 - DNS GARAGE
●
1 - BAND HALL *
2 - BAND OFFICE *
3 - CHURCH
4 - LAC OFFICE *
5 - SCHOOL *
6 - DNS OFFICE *
7 - DINA HEALTH CLINIC *
8 - R.C.M.P. *
◆
1 - WOLLASTON CO-OPERATIVE LTD.
2 - THEATRE/POOL HALL
3 - WOLLASTON LAKE AIRWAYS
4 - EAGLE AIR
5 - NORCANAIR

Wollaston Lake

Source: 1:8000 Air Photo's June 81, DNS Community Planning Plans

2.3 Difference Between Northern & Southern Saskatchewan Conditions

Heat and power energy in Northern Saskatchewan is considerably more expensive than in the south. Fuel oil cost upwards of $ .50 litre as compared to $ .38 and power up to $.39/kW as compared to $0.0442/kW (1985) southern rates.

Compounding this problem are the colder northern climatic conditions 8210 degree days (DD) for Uranium City as compared to 6030 DD in the Saskatoon area.

The combined effect of these factors more than double the annual energy cost for an equivalent facility in the north.

Because of the northern communities remoteness, the servicing of heating equipment is difficult and costly hence they are usually of a intentionally simplified design, sometimes at the expense of energy conservation features in the quest for reliability. Tradesmen are lacking in most of the Northern Communities, and access for them in many cases is only available through air transportation at a considerable cost.

A two way flight from La Ronge to Stony Rapids is $333. Often service calls involve two trips, one for diagnosis and a second for repairs. To minimize this expensive situation, some agencies have attempted standardization of equipment, particularly heating units, so that servicing is more readily effected through a sort of universal familiarization with equipment and spares.

Simplicity with long term reliability with minimum maintenance requirements is the first priority in the operation of northern institutional facilities particularly with respect to the mechanical system.

Energy conservation because of the service security aspect understandably would be a secondary consideration.

The staff attitudes towards maintaining facilities is oriented towards maintaining function and comfortable space conditions for work activities; energy conservation being given a passing consideration if brought to their attention.

A significant portion of the personnel associated with the various facilities come from southern communities and since they do not pay or even see the energy bills including those for their accommodation, most are not conscientiously aware of the premium paid for energy in the north. Other than a curiosity satisfaction when made aware of the high cost difference, there essentially is no driving incentive to adopt energy conservation habits particularly if additional or special input were required above and beyond that of an equivalent situation in the south. Therefore without financial incentive, successful energy conservation measures must be effective without additional personnel activity and without impeding the maintenance of satisfactory space conditions. A simple example of the latter is time clock controlled off hour ventilation shut down; if the unit gets out of sequence because of power failure or battery burn out, it is not long before it's bypassed defeating the energy conservation efforts.

In perspective of budget importance, the Northern Lights School Board in 1984 spent 56.4% of its budget on salaries and wages and 6.8% on energy, indicating the importance of not encumbering the staff with conservation efforts as a one percent increase in labour would have to be offset by a 10% decrease in corresponding energy cost.

2.4 Special Northern Considerations

Energy Mines & Resources Canada have promoted various techniques for reducing oil and other energy consumption throughout Canada. These are generally in respect to southern Canadian conditions where normal fuel, utility rates and construction costs prevail. For a meangingful evaluation of the facilities examined in this study, the most apparent conservation measures are identified and are re-evaluated on a unit price basis for average conditions prevailing in northern Saskatchewan. The favourable identified options, those having less than 5 year payback, are then considered for application for each of the respective buildings in the various communities. The retrofit costs and projected annual cost savings are both identified.

2.5 Methodology

In order to assess the applicability of the off oil/ conservation options thus identified, an on site tour of the facilities were made by two man teams.

The findings of the earlier energy audits (1) for each of the buildings conducted by either the National Research Council, Saskatoon, (Hot Can) or Saskatchewan Power Corporation (ENERSAVE, Mobile Energy Audits) were reviewed. Where conservation measures were identified, these were assessed and either discounted on the unit price retrofit cost basis or short listed for further field evaluation.

The on site examination included a confirmation of envelope conditions, R factors, weather stripping and architectural details and materials.

Combustion efficiencies were spot checked (approximately 50% of units) and mechanical exhaust and ventilation system design and operation routine were confirmed.

In respect to electrical system, lighting levels were identified with number of lamps and fixtures in the respective areas. Special electrical loads such as electrical heaters, clothes driers and kitchen ranges were identified as well as special use of these facilities such as community washing, etc.

The approach used in the cost evaluation was to use one common figure for fuel, power and retrofit costing. The electrical cost is uniform throughout the north for institutional buildings at an average of $ .39/kW.

Heating oil and propane (comparable on a wattage basis) vary from agency to agency and community to community and in many cases is supplied under tendered contract arrangements.

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(1) UNDER Canada Energy Audit Program (CEAP)

The average 1983-4 unit cost report for the various communities are listed in Table 2.2 as follows:

TABLE 2.2

Average Fuel Oil Unit Cost

In various Communities

In Northern Saskatchewan in 1983/84

1.	Black Lake	$ .41.3/L*
2.	Brabant Lake	$ .40.7/L
3.	Camsell Portage	$ .37.6/L
4.	Deschambault Lake	$ .37.7/L
5.	Fond Du Lac	$ .40/L
6.	Garson Lake	($ .25.5/L)+
7.	Kinoosao	$ .35.5/L
8.	South End	$ .38.7/L
9.	Stony Rapids	$ .39.8/L
10.	Wollaston	$ .39.9/L
	Average	$ .39.1/L
	Rounded	$ .40.0/L

* Annual Cost divided by annual consumption

+ Not averaged in total

The energy cost for retrofit evaluation was taken at $ .40/L for fuel oil and $ .39/kW for electrical power for 1984 conditions.

The retrofit costing and payback assessments are considered in the following Chapter 3.

A review of alternate energy sources follow latter in Chapter 4.

3.0 ENERGY CONSERVATION MEASURES

3.1 Options to be Considered

Energy conservation can be affected by either reducing losses such as the heat flow out of building envelopes or by increasing efficiencies and thus reducing energy consumption while still performing the same task, i.e., the use of energy efficient fluorescent lamps and lighting fixtures.

The guideline list of retrofit activities recommended by the Federal Energy Management Program by Energy Mines and Resources Canada was broadened herein for evaluation because of the unique northern Saskatchewan situation. The considered options are shown in Table 3.1. The architectural and most mechanical options are aimed at reducing losses where as the electrical ones generally involve energy reduction through increased efficiency, i.e. more efficient light sources.

Table 3.1

Envelope Upgrading

Retrofit Option No.	Description
#1	add exterior insulation (to walls)
#2	add interior insulation (to walls)
#3	add attic insulation
#4	increase flat roof insulation
#5	add triple glazing to double glazed windows
#6	add vinyl film over windows
#7	add exterior storm door
#8	add weather stripping to exterior doors
#9	add on porch or vestibule air lock

Heating System Retrofit

#10	Use temperature set back thermostats
#11	incorporate entrance way floor directed heating

#12	add outside air controlled ventilation damper (to furnaces)
#13	add on 100% outside air shutoff on mixed air ventilation units
#14	Add on 100% outside air shutoff and intermittant fan switch control
#15	replace furnace with high efficiency condensing furnaces

Electrical System Retrofit

#16	replacing existing fixture lamps with Econo-Watt type lamps
#17	replacing ballast's and lamps with energy efficient units
#18	incandescent lamps replaced with socket fluorescent lamps
#19	replace 150 watt incandescent light with fluorescent fixture
#20	replace exterior incandescent with sodium vapour
#21	change exterior Par 150 incandescent to sodium vapour
#22	change exterior MV to HPS lamps
#23	convert diesel generator direct drive sheave (fan) to electric clutch

Other options, "that are one or two building specific are dealt with individually, under the respective building assessment chapters".

3.2 Unit Cost Figures

The feasibility of retrofit options for energy conservation are evaluated first on a unit price basis for average costs and environmental condistions in the north. The feasible alternative, viz, those having payback of less than 5 years, are cost totalled for the respective buildings for which they apply and tabulated in the respective building assessment chapters later in the report.

The unit prices used in the option evaluations were determined from various sources including building construction cost data 1984, by Robert Snow Means Co., quotations from Saskatoon glazing, insulation, roofing, mechanical and electrical suppliers and construction firms.

The unit cost break downs are for Saskatoon area construction for first quarter 1985 construction period with January 17, Engineering New Record Construction Cost Index 4172 (1913 base) and Canada Construction Building materials price index (non-residential) 117.3 (January 1985).

The unit cost of performing work in the north is very dependent on the unit quantities involved. One general contractor who has constructed schools and related facilities throughout Northern Saskatchewan indicated that their premiums for general construction work where long service road, viz, to Southend or where barging from Fort McMurray was involved, averaged 18 percent over the last several years. For large bulky items such as insulation the premium was in the range of 30 percent.

The premium cost for subtrade work in the north is reportedly quite variable depending on the competative situation influenced by the market saturation in the south. The estimated premium for mechanical and electrical trades over the past year is 30%.

The overhead and profit margin under average competative conditions is estimated at 30%. These figures are used in the retrofit options unit price evaluations.

It is appreciated that these unit costs are applicable only for volume of work over $25,000.

In order to bring some retrofit work into this scope it may be necessary to amalgomate the work of one project with that of another in the same or an adjacent community.

3.3 Evaluation of Retrofit Options

Retrofit Option #1, add exterior insulation and siding R10 to R20.

If the existing siding is in poor condition or the interior walls are encumbered with cabinets, etc. It may be more expedient to upgrade the wall from the exterior. The cost will vary slightly depending on the siding material used. However, the figures shown are sufficiently representative to show that this is not a viable alternative unless only the incremental cost of the insulation were considered. Then the payback period would be 7.5 years which is not sufficiently low for further consideration except for electrically heated buildings.

Retrofit Option #2, interior furring, insulation and drywall,(R10 to R20) RS1 1.7 to RS1 3.5.

Where interior areas require upgrading this could be considered a viable alternative however not by itself and is therefore not considered further.

It should be noted that with option 1 and 2, no credit for possible infiltration reduction was included. For very leaky walls, the actual payback would improve and together with other considerations may make it a reasonable alternative for special upgrading cases.

Retrofit Option #3, adding exterior attic insulation to gable roof building (R 10 to R40) RSI 1.7 to RSI 7.0.

Where access to the ceiling space is available, this is identified as a viable alternative and is considered for the various buildings herein.

Retrofit Option #4, flat roof insulation from (R12 to R40) RSI 2.1 to RSI 7.0.

The payback period is excessive with this alternative. It should only be considered in the instance where the existing insulation required replacement and only the incremental cost of increased insulation was invested for energy conservation, in which case the payback period would be approximately 5 years. None of these situations were identified therefore this option is not considered further.

Retrofit Option #5, triple glazing double glazed windows.

Most of the residential building type facilities in the respective northern communities have alum or vinyl slider windows, many of which had deteriorated weather stripping and consequently high infiltration leakage.

One alternative to improve the performance of these windows would be to install a third glazing to the exterior of the existing double glazing consisting of a perimeter PVC stop to provide an air gap and top and bottom U-channel in which an alum framed plexiglas or Lexan pane could be lifted up into the top channel and dropped into the lower channel during the winter season and removed, washed and stored during the summer if ventilation were desired. The main advantage of this over option #6 is that it protects the existing window panes (in the winter at least) and is not subject to glass vandalism damage. This alternative has a 6 year and longer payback with the Lexan (unbreakable plastic) glazing which is not considered cost viable for further consideration. If added window protection was a paramount consideration, then the triple glazing with plastic could be considered a viable alternative.

Retrofit Option #6, vinyl film seal over windows.

Where vandalism is not a major consideration, the annual placement of a Heat Shrunk Clear Vinyl film on double edge tape around the windows particularly in teacherages, Health clinics, nurses residences and offices, is a viable energy conservation measure. This will improve interior comfort conditions by reducing cold drafts from leaky windows. This is considered for all facilities where it is anticipated vandalism would be minimal.

Retrofit Option #7, adding exterior storm door.

Adding storm doors is not found to be cost effective and is not considered further.

Retrofit Option #8, weather stripping exterior doors.

Existing vinyl weather stripping on most of the existing northern door systems are in poor condition.

This option evaluates its replacement with a better grade of closed cell foam neoprene butt type of weatherstripping. This is considered for each of the respective buildings. It was observed that some schools had on site stores of weather stripping replacement, however there was no apparent schedule for its application in badly needed replacement areas. Because of the apparent energy savings and early payback this alternative should be given top priority.

Retrofit Option #9, add on porch or vestibule.

Many facilities in the north (Saskatchewan) are provided with vestibules air locks primarily for comfort rather than energy reasons, However, it was observed that many of these vestibules served only as a hall way extention with the interior door being left open to provide foot wear overflow and improved drying conditions for them. These should be provided for the dual purpose reason indicated. Option #11 deals with optimizing heat distribution for this purpose.

Adequately sized vestibules, viz, sized to accommodate footware volume, and adequately heated with fan coils to floor level with horizontal discharge coupled with large night time temperature set backs are recommended for general entrance application throughout the north for new facilities. The payback for retrofit work is excessive based on energy saving only and therefore has to be justified for two or more objectives. This option has only been considered for special circumstances.

Retrofit Option #10, temperature set back.

Most of the institutional buildings examined were utilized for less than 50 hours out of a possible 168 hours per week. Considerable energy can be saved by reducing the room temperatures by up to 6 degrees C during non occupancy periods, for example 12 hours per day during week days and 24 hours per day during week ends. This would allow warm up time and provide approximately 15% in energy savings. With the advent of new solid state battery back up thermostats, reliability is very high with little chance of getting out of sequence because of power outage, etc. Where agencies are essentially on 24 hour call, such as the RCMP and Health Clinics, a 6 degree C temperature set back is not considered practical because of the warm up time required. However, consideration could be given for 3 degrees C set back for an annual savings in the range of 7.5 %, giving a one year payback. These options are recommedned for most of the facilities.

Retrofit Option #11, entrance way floor direct heating.

As indicated in option #9 vestibules are used as footwear drops as well as air locks, however most of the vestibules examined either had ceiling or under floor mounted fan coil units discharging vertical blankets of warm air across doorways. Unfortunately, with this arrangement, lower cold air rushes in on open door entry and has a tendency to stratify. To resolve this problem, either the interior air lock doors are left open or portable electric heaters are placed in the vestibule in an attempt to warm and dry out the foot-ware. It is recommended that the air discharge be modified for discharge at floor level both across the door and perpendicular to the door so that a current of warm air is spread across the floor nullifying the need of supplementary electric heaters or ventilation.

Retrofit Option #12, outside air controlled ventilation.

A fairly simple way of providing ventilation for buildings with High Boy furnaces located in furnace rooms equipped with normal combustion air inlets is to remove the fan covers. This will allow the drawing in of outside air through the combustion air inlet into the furnace. However, this can double the load on the furnace and essentially double the heating costs during very cold periods making it an impractical way of ventilating buildings.

Essentially the same arrangement exists where there is a significant outside air connection provision to the return air. Some are provided with outside dampers, some manually operated and some are equipped as mixed air controllers based on maintaining a set point supply air temperature. The problem with both of these arrangements is that cold outside air is being introduced into the building during unoccupied periods involving unnecessary heating expenditure.

It is suggested that all outside air intakes be provided with motorized dampers as outlined in option #13 and that the furnace fan covers should be maintained in place during the heating season.

The additional heating cost encountered when leaving the fan covers off is estimated at of $400/year for a fan operating on a cyclic heating cycle and over $1200/year for a system where the fans operate continuously. With multiple furnace installations the cost is proportionally greater.

Retrofit Option #13, ventilation unit -100% outside air shut off with separate minimum 10% outside air damper.

As suggested in option #12 all outside air supplies should be provided with motorized dampers, duct stat temperature control and a manual switch in the administrator's office to permit him or her to operate the ventilation system only during the occupied time in the building. During extemely cold periods, when temperatures are blow -30 degrees Celsius the outside air would not be required because high infiltration and door flush out would provide ample fresh air. The manual control would permit selected ventilation control for evenings or week end functions.

Option #13 diagram illustrates a mixed air controlled system utilizing a return air fan. Generally the mixed air is set from 12 degrees to 15 degrees C with a physical minimum stop position on the outside air dampers for approximately 10% outside: some units are combined heating and vent units, others serve as ventilation units only and are provided with time clock stop/start control. Unfortunately, because of frequent power outages in the northern communities, the older mechanical style clocks get out of adjustment and because of resetting difficulties they are occasionally abandoned with the ventilation units being left on continuous operation. Newer solid state battery back up time clock units would alleviate this problem.

It is suggested that the outside air dampers should be fully closed during non occupancy periods and that the units be provided with manual control switches in the administration area for ventilation on-off control. This can be accomplished by replacing the outside air damper with a two section damper, one operating by mixed air controller with summer/winter switch for winter off/summer on and the second sized for 10% outside air operating on a duct stat and ventilation control switch in the administrator's office. The latter should be tied into the on-off ventilation (furnace fan) control that would provide continuous fan operation during occupied periods for ventilation such as for school class rooms.

The annual energy saving with the outside air shut off during unoccupied periods is $502 per year for an average size furnace. This outside air control is recommended for units equipped with mixed air control.

Retrofit Option #14, ventilation unit -100% outside air shut off.

Some of the furnace facilities are provided with continuous or alternative intermittent fan operation by a fan switch located on the furnace.

It was observed that in some instances the occupant users were not familiar with the switch location or found it inconvenient to use, consequently, the ventilation fan was left on continuous 24 hours operation. It is suggested that the fan switch be wired into the administrative area and serve as a common switch for outside air and continuous fan operation. The switch could be labelled ventilation on-off. For multiple furnaces there would be multiple switches. The other alternative is to interconnect the specific room(s) lighting switch(s) with a 24 V relay for the same control, however this would involve more wiring in a retrofit operation and therefore is not considered further.

The annual estimate energy saving using the outside air and furnace control as proposed by option #14 is $1221/year per conventional size furnace and higher for larger air handling units. This option is recommended for consideration particularly in the schools.

Retrofit Option #15, furnace replacements with high efficiency induced draft hot air condensing furnaces.

This retrofit option illustrates the economics of replacing existing furnaces with high efficiency condensing units. Although no oil condensing units other than Eneroil Research's add on condensing unit has been approved by CSA at this time, it has been included in the comparison table for possible future consideration.

There is no apparent data to indicate the type of maintenance that may be required with condensing furnaces therefore it has been assumed in the comparison table that gas units would require similar maintenance to that of an atmospheric gas fired forced air furnace and similarly an oil unit to that of a forced draft oil fired furnace.

The Northern Lights School Division indicated that for oil furnaces they provide approximately one maintenance service call per year and two breakdown calls for a rough average of 16 hours plus travel cost per furnace. The combined cost has been estimated at $513/year per furnace and is included as a saving in the propane vs oil condensing furnace conversion comparison. It can be seen that the payback periods are medium. The respective costs of oil and propane were found to be competitive for most communities. This option is recommended for new installations, however, is not included in the proposed retrofit options because of the medium payback period.

Miscellaneous Heating & Vent Retrofit Options

There are specific retrofit options that are site specific to one building. These are dealt with in the individual building summary chapter.

Retrofit Option #16, relamping fixtures with econo-watt lamps.

Because of the high electrical power cost in these northern communities, improved utilization efficiencies can offer significant savings. Most of the electrical power is utilized for lighting and operating mechanical system motors. Reduction in lighting energy can be accomplished in three ways: by using higher efficiency lamps, by using a high efficiency lamp and ballast combination (fluorescent) or by changing to a different light source having a higher efficiency; i.e., incandescent to fluorescent. These are covered in option #16 to #22.

For older buildings having the likely prospect of being replaced in the next decade or so, it is not reasonable to replace lighting fixtures for power conservation. The alternative is to replace the existing 40 watt fluorescent lamps with the new 35 watt econo-lamps that offer an approximate 12% energy saving. These could be replaced on a group basis or on an as-failed basis. The average life of the lamps based on 2000-3000 'on' hours per year would be between 7 to 10 years. The starting stress is reportedly higher on older ballast (more than 15 years old) and may cause them to burn out. Therefore replacement of some ballast may also be required on such a change over. There is a slight drop in light output with this alternative which probably will not be noticed with new replacement lamps.

Retrofit Option #17, replace ballasts and lamps with high energy efficiency units.

Further improvement in lighting (fluorescent) efficiency can be realized by the replacement of both existing ballast and lamps with high energy efficient units for an approximate 20% energy saving for no reduction in long term lighting levels. The labour cost for this alternative is for volume work and could be considered applicable if group lamp replacement under contract were being carried out. All new fixtures should be of the high energy efficient ballast and lamp type.

Retrofit Option #18, replace socket incandescent lamps with socket fluorescent lamps.

Incandescent lights are very inefficient light sources costing $0.94/day to operate a single one hundred watt lamp. In recent years a new series of socket fluorescent lamps have become available to replace incandescent lamps for energy conservation. A 12 watt fluorescent unit has the equivalent light output of a 100 watt incandescent. The only draw back is the cost of a lamp replacement at approximately $9.00 which is considerably more than a comparable incandescent lamp in the event of accidental breakage. The screw ballast socket to which the lamp plugs into is purchased for the original conversion with replacement lamp as required afterwards for burn out replacements (10 times longer than incandescent.) The extra cost of replacing incandescent burn outs is not shown in the comparison.

Because of the large energy savings with this alternative it is recommended for all incandescent lamp replacements except for the higher wattage fixtures.

Retrofit Option #19, replace 150 watt incandescent lights with fluorescent strip fixtures.

There are many areas in which high wattage (150-200) lamps are used to secure reasonable lighting levels. The alternate is to replace these inexpensive fixtures with two lamp high efficiency fluorescent strip fixtures with a resultant power saving and payback of $63/year and 1.4 years respectively. This again is recommended for all applicable cases.

Retrofit Option #20, change existing exterior incandescent fixtures to sodium vapour.

Where exterior security lighting is required and presently being lighted by a 100 watt incandescent fixture, it can be replaced with a low wattage sodium vapour light fixture that will offer $101 per year annual power saving (on photo cell operation) with a 2.5 year payback. Relatively vandal proof fixtures are available for this purpose. Because of the slow start it is not suitable for switched lighting on demand.

Retrofit Option #21, change existing exterior Par 150 W flood lights to 50 W sodium vapour.

Further to option #20 where exterior lighting is accomplished with 150 watt flood par lamp these can be substituted with 55 watt sodium vapour lamps (HPS) for an annual energy saving of $135 per year offering a two and half year payback. The draw back with this option is that if the lights are subject to any amount of vandalism, the lamp cost replacement (valued at approximately $80) would nullify any potential saving of using the higher efficient light source if they had to be replaced more than once per year. In this case should be replaced with the 90 Watt energy efficient halogen type par lamps.

Retrofit Option #22, change existing 250W MV to 100 W HPS lamps.

Where buildings are provided with 250 W mercury vapour outdoor fixtures for security lighting an annual saving (photo cell operation) of $286 could be realized by replacing the units with a lower wattage higher light efficiency vandal proof high pressure sodium vapour fixture for a payback period of one year. A reduction in light output would be experienced with a 50 watt alternative (50%), a 100 watt unit would offer comparable light level if necessary for area activities in which case payback would be 2 years.

Retrofit Option #23, convert diesel generator set direct drive cooling fans to electric clutch control.

Most of the Diesel Electric Plants consist of two or three 50 to 100 kW Diesel generator trailer units interconnected by simple service drops to a pole mounted step-up transformer(s).

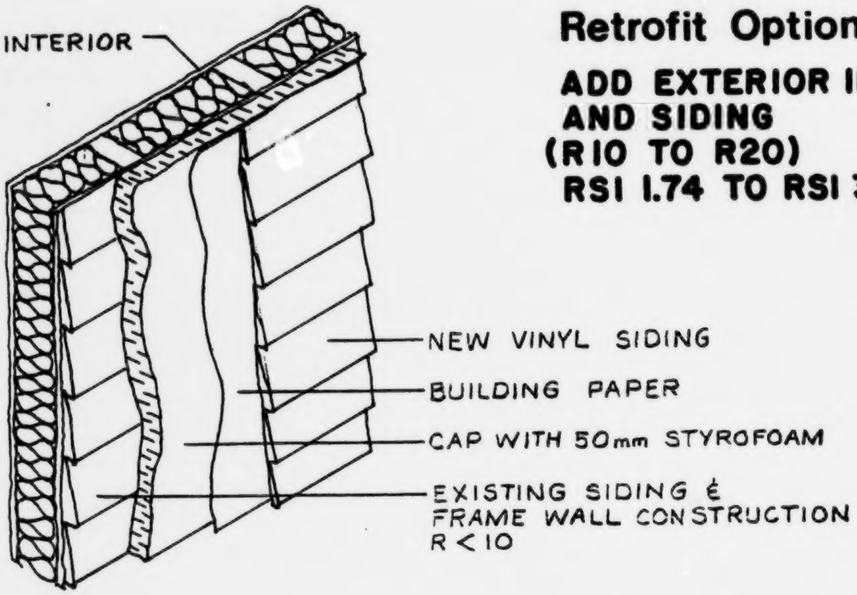
The units are air cooled with an engine mounted radiator and engine driven fan. The air discharge from the fan is partially recycled in the generator building with automatic damper control to maintain a relatively constant 20 degree C room temperature. A portion is also ducted to adjacent generator trailers for heating in units where their generators are not operating. The heat output on cold days is adequate for trailer heating but little is available for off site use.

The generators can operate at 30 to 40% load factor with the cooling fan being sized for high ambient full load operation, an estimated 70% fan power could be saved with the use and operation of an electrical clutch fan belt sheave during low demand periods. These are recommended for consideration.

There are other conservation measures that could be undertaken to conserve energy such as replacing older motors with newer high efficiency units, replacing electric clothes driers and ranges with gas fired units, etc., however, these were found to have high payback periods and were not considered further. As indicated earlier in the text there are some site specific conservation measures that are considered and dealt with in the specific building reviews.

Retrofit Option 1

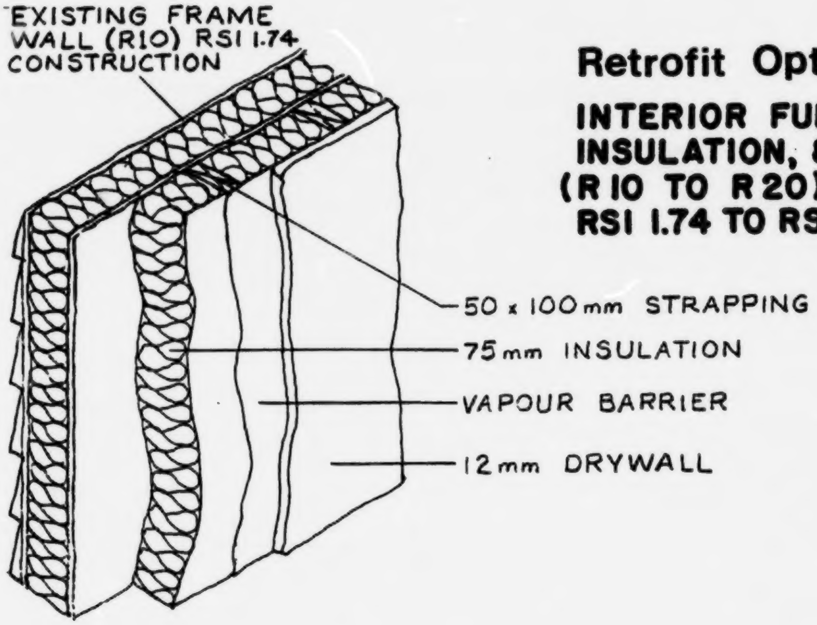
ADD EXTERIOR INSULATION AND SIDING
(R10 TO R20)
RSI 1.74 TO RSI 3.48


INTERIOR
NEW VINYL SIDING
BUILDING PAPER
CAP WITH 50mm STYROFOAM
EXISTING SIDING & FRAME WALL CONSTRUCTION R < 10

Unit Cost (1985)	
Insulation	14.54
Building Paper	1.68
Siding (Vinyl)	17.67
Trim	7.83
30% O & P & 18% NF	22.27
Total	64.00/m^3
UNIT ENERGY SAVING	\$ 2.96/m^2
Rsi 1.74 to 3.48 (R10 to R20)	
9050 DD (20^oC)	
UNIT FUEL SAVING	7.23 l/m^2/yr
UNIT PAY BACK	21.6 yrs.

Retrofit Option 2

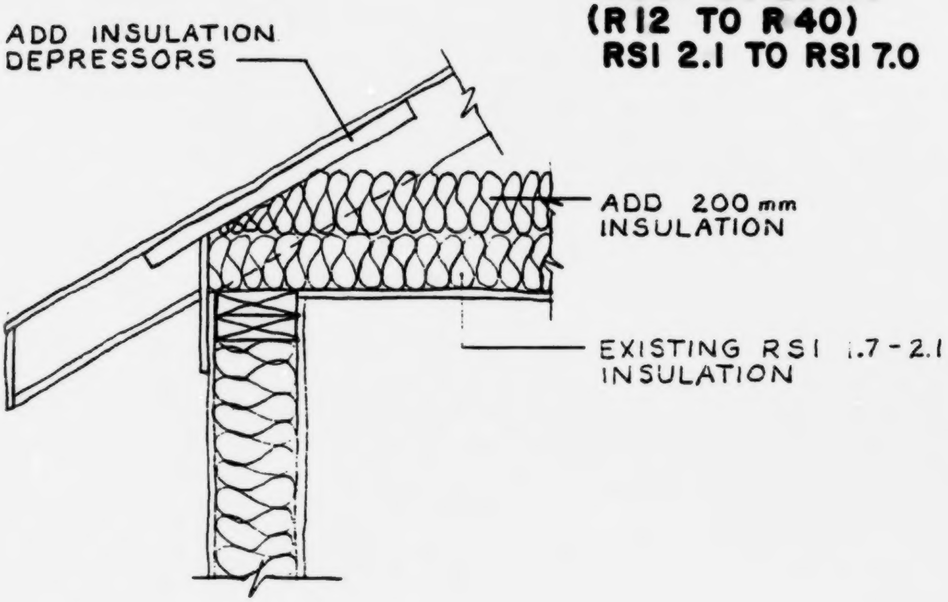
INTERIOR FURRING, INSULATION, & DRYWALL (R 10 TO R 20) RSI 1.74 TO RSI 3.48


EXISTING FRAME WALL (R10) RSI 1.74 CONSTRUCTION
50 x 100 mm STRAPPING
75 mm INSULATION
VAPOUR BARRIER
12 mm DRYWALL

Unit Cost (1985)	
Studs	9.94
Insulation	3.90
Poly Film	1.30
Drywall	4.75
Finish	2.48
Painting	5.50
30% O & P + 18%NF	14.88
Total	$42.75/m^2
UNIT ENERGY SAVING	2.96/m^2
Rsi 1.74 to 3.48 (R10 to R20)	
Unit Fuel Saving	7.23 l/m^2/yr
Unit Pay Back	14.4 yrs

Retrofit Option 3

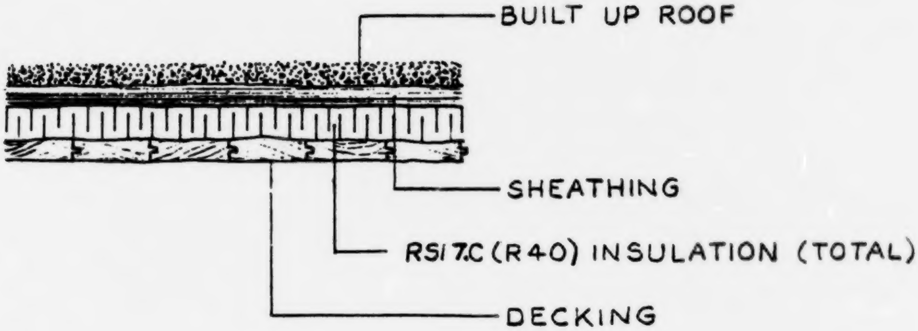
ADDING EXTERIOR ATTIC INSULATION TO GABLE ROOF BUILDING (R12 TO R40) RSI 2.1 TO RSI 7.0


ADD INSULATION DEPRESSORS
ADD 200 mm INSULATION
EXISTING RSI 1.7 - 2.1 INSULATION

Unit Cost (1985)	
Insulation	7.00
Depressors & Baffles	3.24
30% O & P & 30%NF	7.06
Total	17.30
UNIT ENERGY SAVING	$ 3.45/m^2/yr
RSI 2.1 to 7.0 (R12 to R40)	
UNIT FUEL SAVING	8.40 l/m^2/yr
UNIT PAY BACK	5.0 yrs.

Retrofit Option 4

FLAT ROOF INSULATION FROM (R12 TO R40) RSI 2.1 TO RSI 7.0

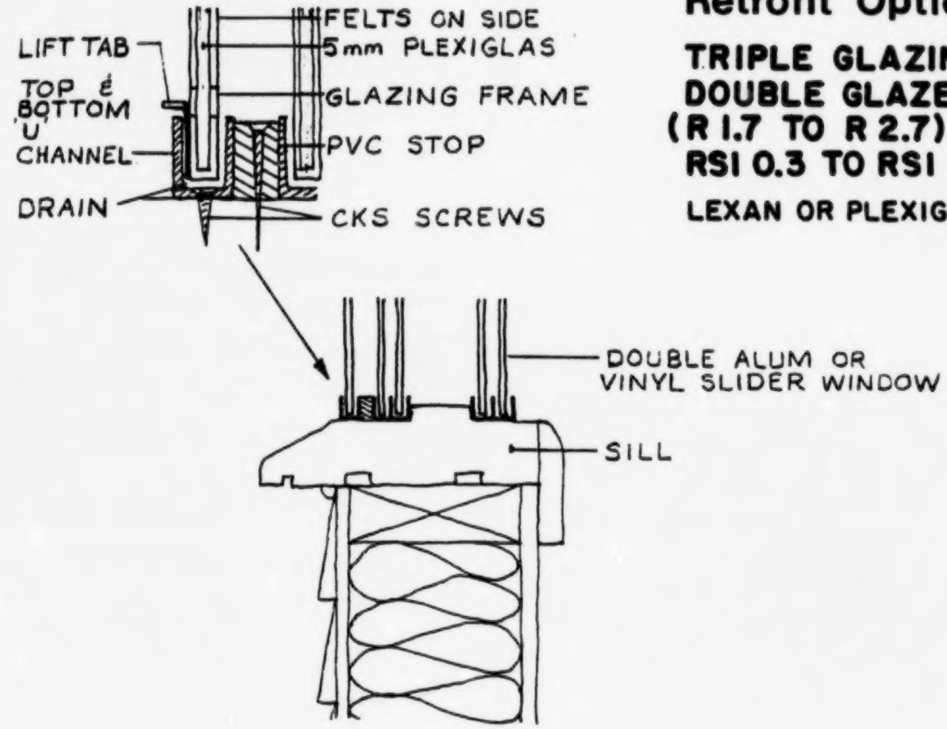

BUILT UP ROOF
SHEATHING
RSI 7.0 (R40) INSULATION (TOTAL)
DECKING

Unit Cost (1985)

Remove old roofing	10.80
Insulation	27.00
Sheathing	2.38
Adhesive	2.16
Roofing	8.10
Cant & Flashings	8.64
30% O & P + 18% NF	18.90
Total	77.98/m^2
UNIT ENERGY SAVING RSI 2.1 to 7.0 (R12 to 40)	3.45/m^2/yr.
UNIT FUEL SAVING	8.40 l/m^2/yr.
UNIT PAYBACK	22.60 yrs

Retrofit Option 5

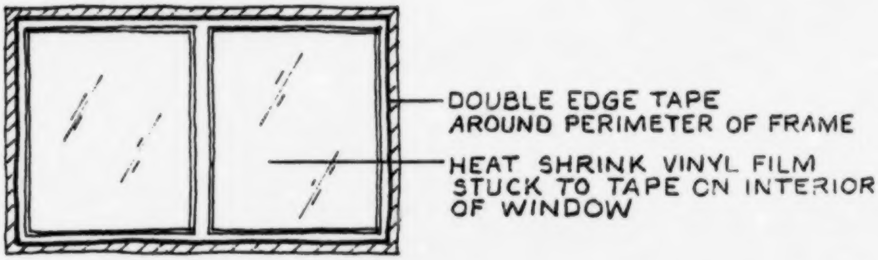
TRIPLE GLAZING
DOUBLE GLAZED WINDOWS
(R 1.7 TO R 2.7)
RSI 0.3 TO RSI 0.47
LEXAN OR PLEXIGLAS


FELTS ON SIDE
5mm PLEXIGLAS
LIFT TAB
TOP & BOTTOM 'U' CHANNEL
GLAZING FRAME
PVC STOP
DRAIN
CKS SCREWS
DOUBLE ALUM OR VINYL SLIDER WINDOW
SILL

Unit Cost (1985)	
Glazing (Plexiglas)	65.00/m^2
Frame & Channels	54.00/m^2
30% O & P & 18% NF	63.55
Total	$182.55/m^2
UNIT ENERGY SAVING (R1.7 to 2.7) RSI0.3 to 0.47	12.90/m^2/yr
Infiltration, 0.8 m^3/h to 0.4	18.26/m^2/yr
Total	$ 31.16/m^{2}yr
UNIT FUEL SAVING	75 l/m^2/yr
UNIT PAY BACK	5.8 yrs

Retrofit Option 6

VINYL FILM
SEAL OVER WINDOWS

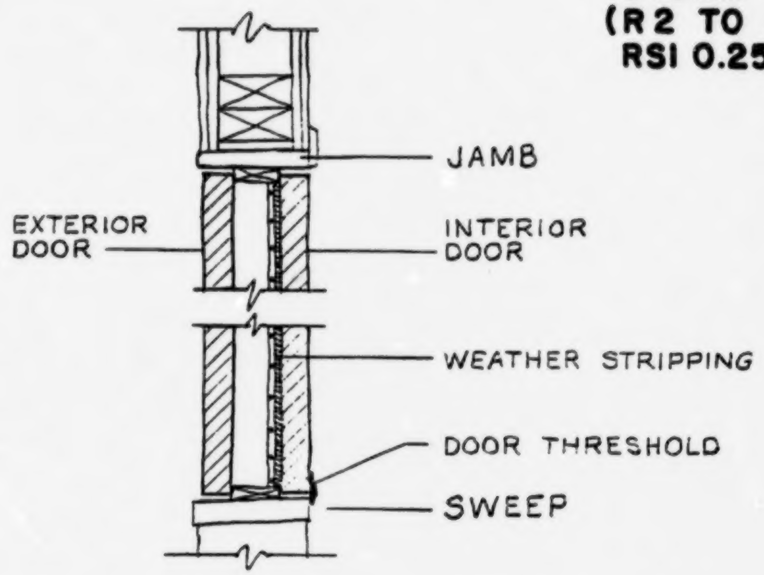

DOUBLE EDGE TAPE AROUND PERIMETER OF FRAME
HEAT SHRINK VINYL FILM STUCK TO TAPE ON INTERIOR OF WINDOW

Unit Cost (1985)	
Film Kit	1.50/m^2/yr*
Labour	4.50
30% O & P + 18% NF	3.20
Total	9.20/m^2/yr
UNIT ENERGY SAVINGS	\$12.90/m^2/yr
(R1.7 to 2.7) RS10.3 to 0.47	
INFILTRATION (0.8 m^3/h to 1.4)	18.26/m^2/yr
Total	\$ 31.16/m^2/yr
UNIT FUEL SAVING	75 1/m^2/yr
UNIT PAY BACK	in 88 out of 300 heating days

* Includes 15% wastage

Retrofit Option 7

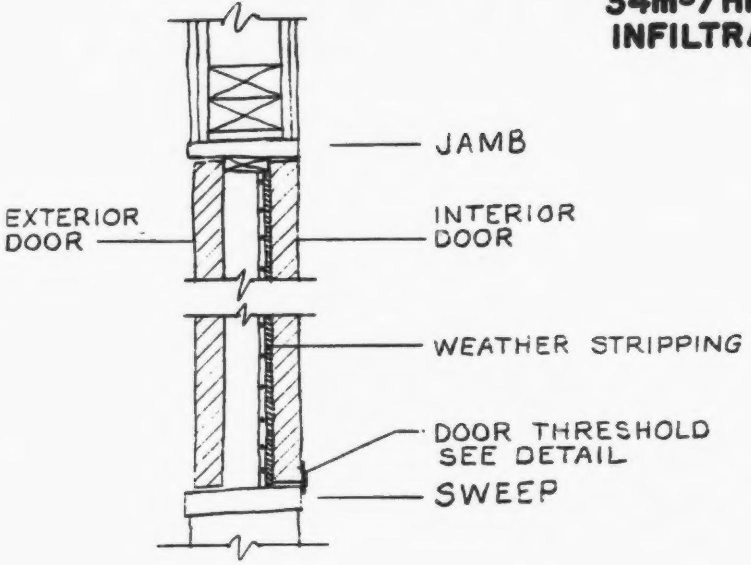
ADDING EXTERIOR STORM DOOR (R2 TO R3) RSI 0.25 TO RSI 0.6

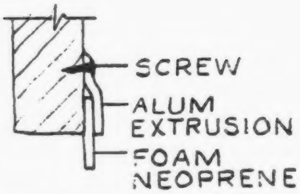

JAMB
EXTERIOR DOOR
INTERIOR DOOR
WEATHER STRIPPING
DOOR THRESHOLD
SWEEP

Unit Cost (1985)	
Door (Wood)	145
Hardware	80
30% O & P & 30% NF	155
Total	$380/Unit
UNIT ENERGY SAVING	
(R2 to R3.5) RSI0.25 to 0.6	$ 24.65/yr
UNIT FUEL SAVING	60 l/yr
UNIT PAY BACK	15 yrs.

Retrofit Option 8

WEATHER STRIPPING EXTERIOR DOORS $34m^3/Hr.$ TO $<20m^3/Hr.$ INFILTRATION REDUCTION


JAMB
EXTERIOR DOOR
INTERIOR DOOR
WEATHER STRIPPING
DOOR THRESHOLD SEE DETAIL
SWEEP


SCREW
ALUM EXTRUSION
FOAM NEOPRENE

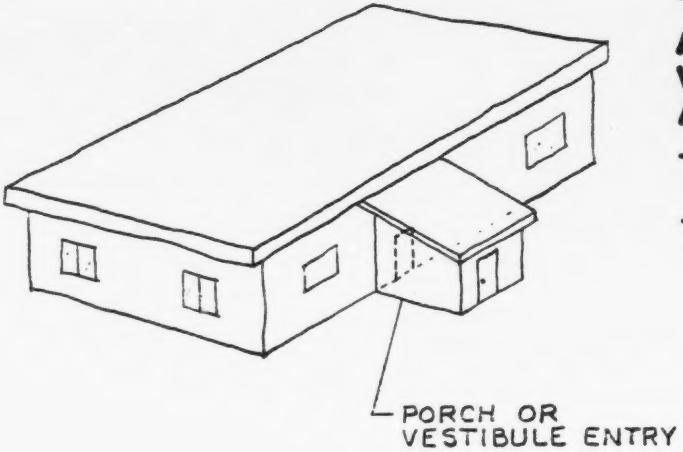
DETAIL

Unit Cost (1985)	
Weather Stripping & Thres.	91.00
30% O & P + 18% NF	48.60
Total	$139.60/Unit
UNIT ENERGY SAVING	$ 50.73/yr
Unit Fuel Saving	123 l/yr
Unit Pay Back	2.7 yrs

Retrofit Option 9

ADD ON PORCH OR VESTIBUAL FOR AIR LOCK ENTRY

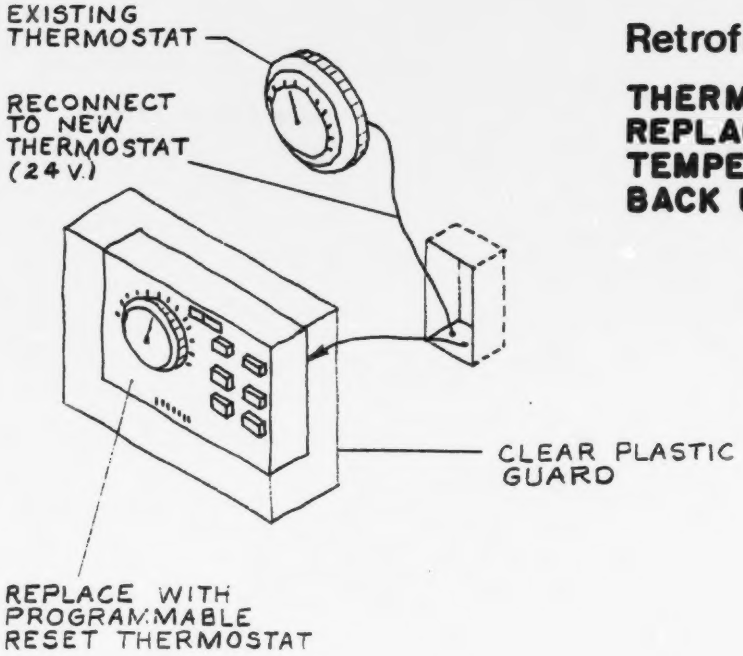
- -FOR 100 PERSON ENTRY - EXITS/DAY
- -FOR 500 PERSON ENTRY - EXITS/DAY



Unit Cost (1985)		
Structure (1.2 m x 2.4 m)	1500	
18% NF	270	
	$1770	
UNIT ENERGY SAVING	(100 PE-E)	(500 PE-E)
(R2 to R3.5) RS10.35 to 0.6	24.65/yr	24.65
3.8 m^3/person	54.79/yr	273.95
Entry-Exit inf		
Total	79.44/yr	286.60/yr
UNIT FUEL SAVING	193 l/yr	726 l/yr
UNIT PAY BACK	22 yrs	5.9 yrs

Retrofit Option 10

THERMOSTAT (FOR FURNACE) REPLACEMENT WITH TEMPERATURE SET BACK UNIT


EXISTING THERMOSTAT
RECONNECT TO NEW THERMOSTAT (24 V.)
CLEAR PLASTIC GUARD
REPLACE WITH PROGRAMMABLE RESET THERMOSTAT

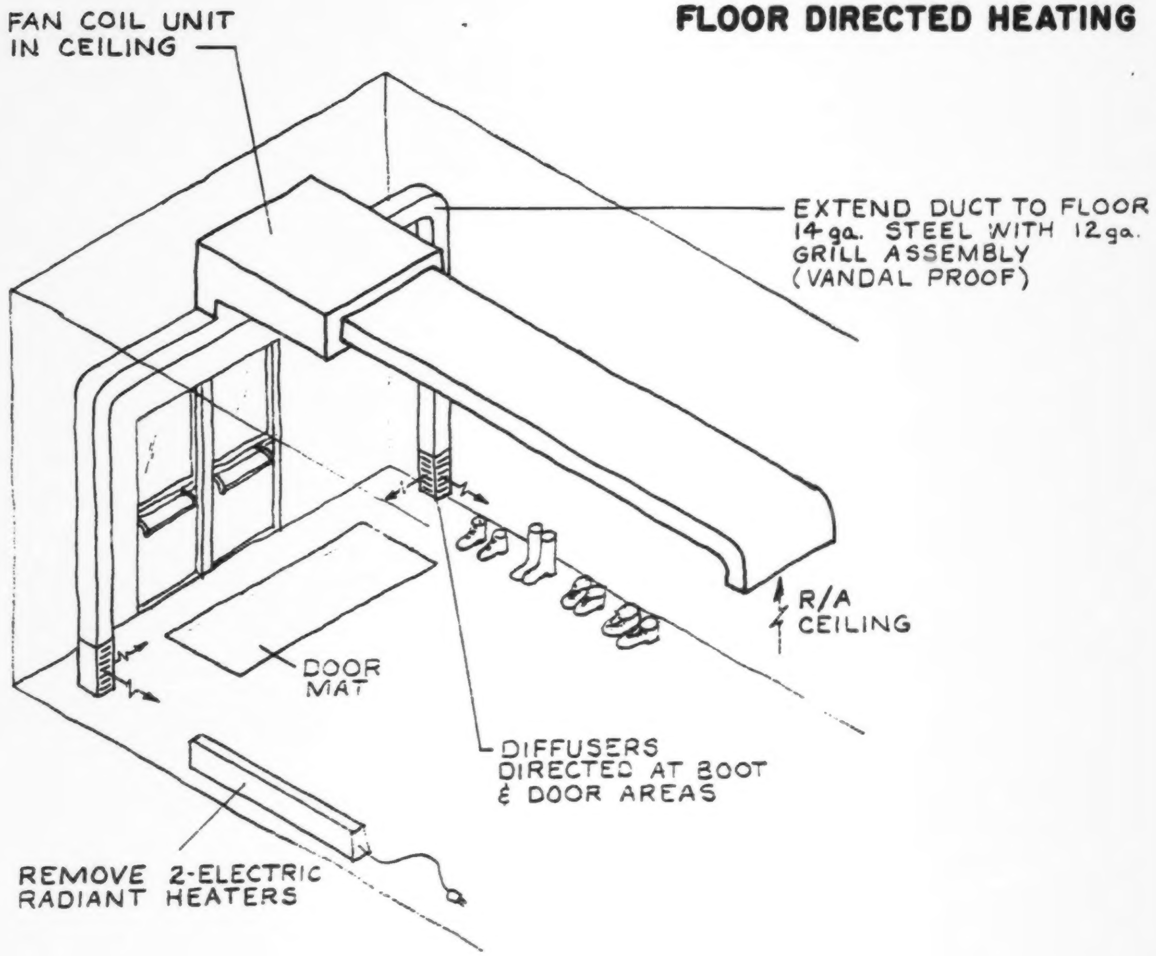
Unit Costs (1985)

Thermostat		125
Installation		25
30% O & P + 30% NF		54
		$ 254/unit *
UNIT ENERGY SAVING	$	(303/y)
UNIT POWER SAVING	$	(97/y)
UNIT FUEL SAVING		747 L/y
UNIT POWER SAVING		247 KW/y
PAY BACK PERIOD		< 1 year

* 30 KW HEATING CAPACITY

Retrofit Option 11

ENTRANCE WAY FLOOR DIRECTED HEATING

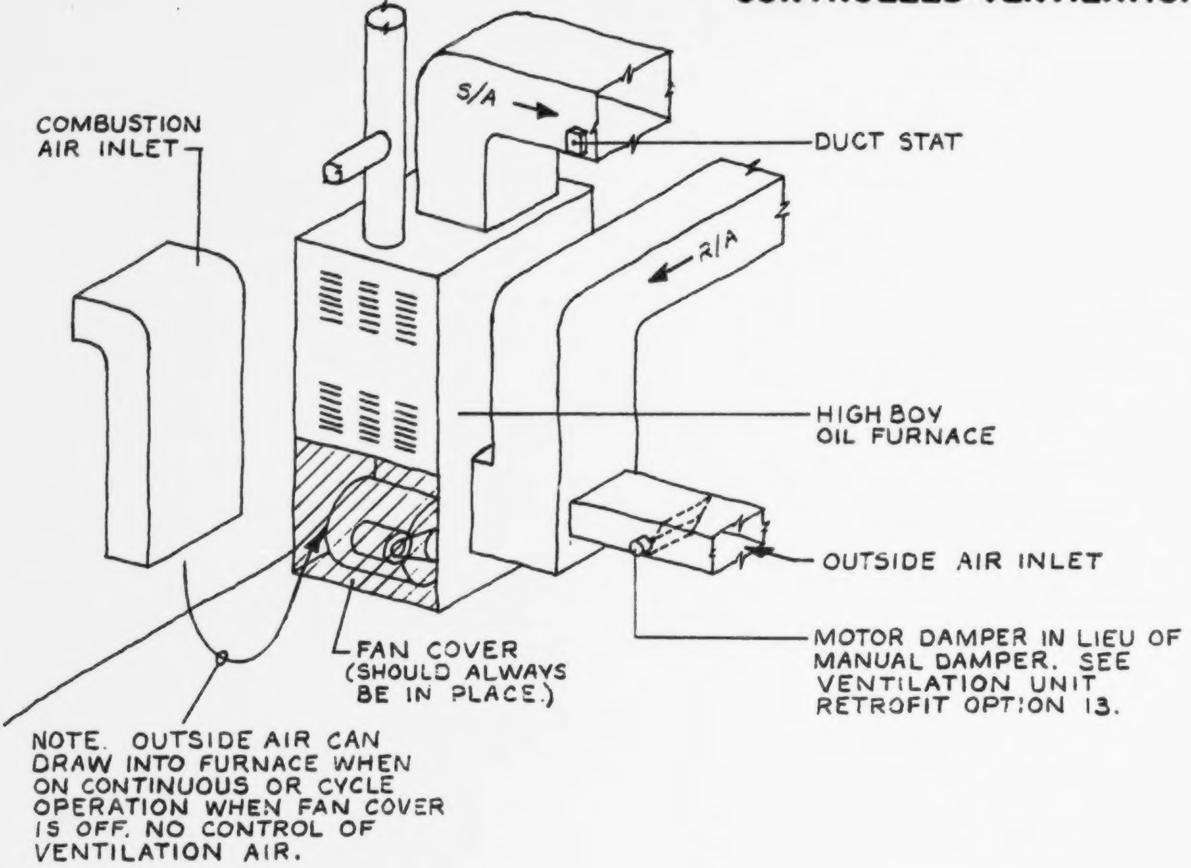

FAN COIL UNIT
IN CEILING
EXTEND DUCT TO FLOOR
14 ga. STEEL WITH 12 ga.
GRILL ASSEMBLY
(VANDAL PROOF)
R/A
CEILING
DOOR
MAT
DIFFUSERS
DIRECTED AT BOOT
& DOOR AREAS
REMOVE 2-ELECTRIC
RADIANT HEATERS

Unit Costs (1985)	
Material	440
Labour	300
30% O & P + 30% NF	510
Total	1250
POWER SAVING *	973/y
PAY BACK PERIOD	1.3 y

* Difference between Elec. & Oil Heating

Retrofit Option 12

OUTSIDE AIR CONTROLLED VENTILATION


COMBUSTION AIR INLET
S/A
DUCT STAT
R/A
HIGH BOY OIL FURNACE
OUTSIDE AIR INLET
MOTOR DAMPER IN LIEU OF MANUAL DAMPER. SEE VENTILATION UNIT RETROFIT OPTION 13.
FAN COVER (SHOULD ALWAYS BE IN PLACE.)
NOTE. OUTSIDE AIR CAN DRAW INTO FURNACE WHEN ON CONTINUOUS OR CYCLE OPERATION WHEN FAN COVER IS OFF. NO CONTROL OF VENTILATION AIR.

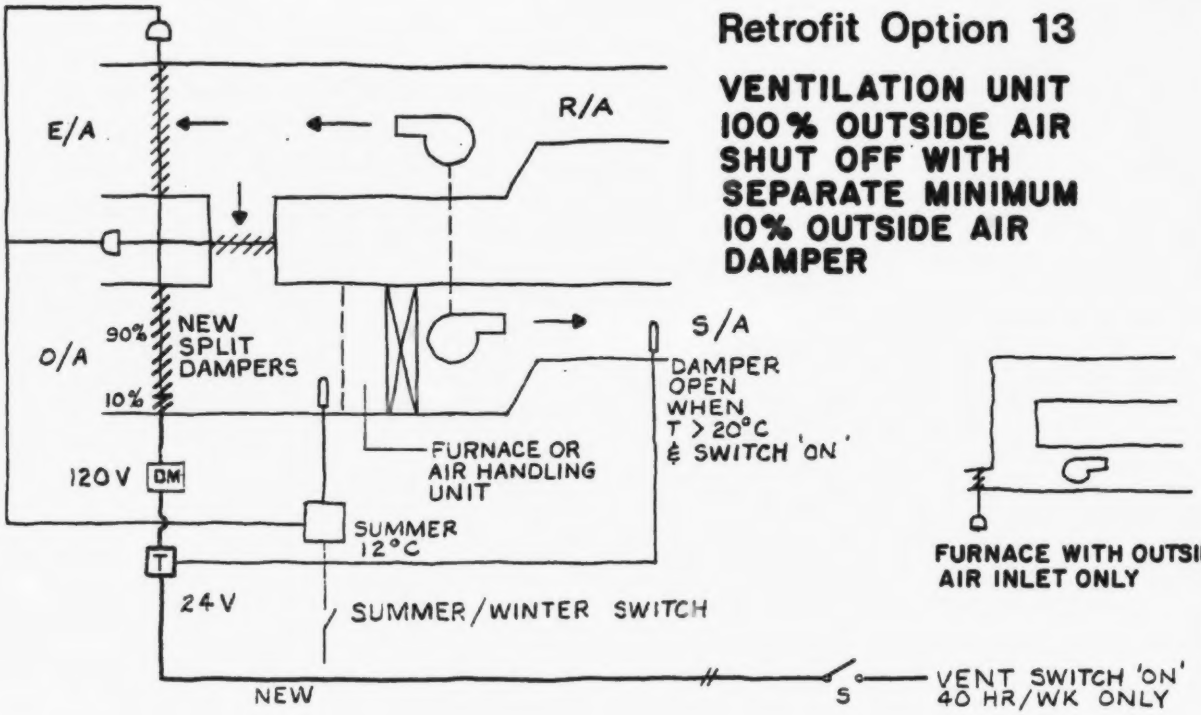
Unit Cost (1985)

Unit Energy Saving With Cover On With Intermittent Fan Operation	$400 +/y/furnace
Unit Energy Saving With continuous Fan Operation	$1200 +/y/furnace

* 30 KW Furance 30% Duty
20% outside air

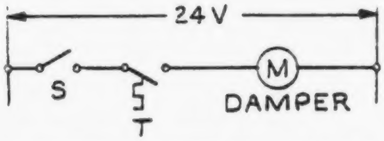
Retrofit Option 13

VENTILATION UNIT 100% OUTSIDE AIR SHUT OFF WITH SEPARATE MINIMUM 10% OUTSIDE AIR DAMPER


E/A
R/A
S/A
O/A
90%
10%
NEW SPLIT DAMPERS
DAMPER OPEN WHEN T > 20°C & SWITCH 'ON'
FURNACE OR AIR HANDLING UNIT
120V
DM
SUMMER 12°C
T
24V
SUMMER/WINTER SWITCH
NEW
S
VENT SWITCH 'ON' 40 HR/WK ONLY

FURNACE WITH OUTSIDE AIR INLET ONLY

NOTES. O/A SWITCH ON IN WINTER PERMIT 10% MIN. OUTSIDE AIR & WHEN OFF ZERO % OUTSIDE AIR NO MINIMUM POSITION ON O/A DAMPERS.
ENSURE MIN. LEAKAGE DURING OFF HOURS.


24V
S
T
M
DAMPER

DAMPER WIRING SCHEMATIC

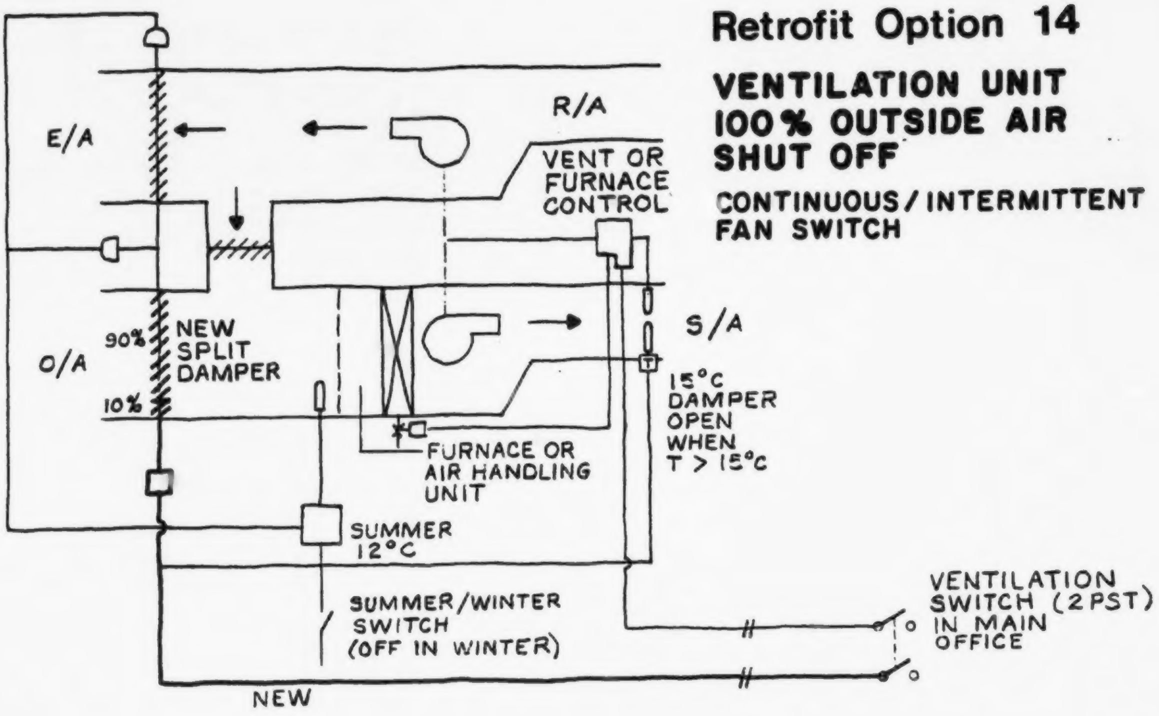
Unit Cost (1985)	
Damper Controller & Hook Up	900
30% o & P + 30% NF	620
Total	$1520/Unit *
UNIT ENERGY SAVING	502/y
UNIT FUEL SAVING	1221 l/yr
PAY BACK PERIOD	3 years

* 30 KW Unit

Retrofit Option 14

VENTILATION UNIT 100% OUTSIDE AIR SHUT OFF

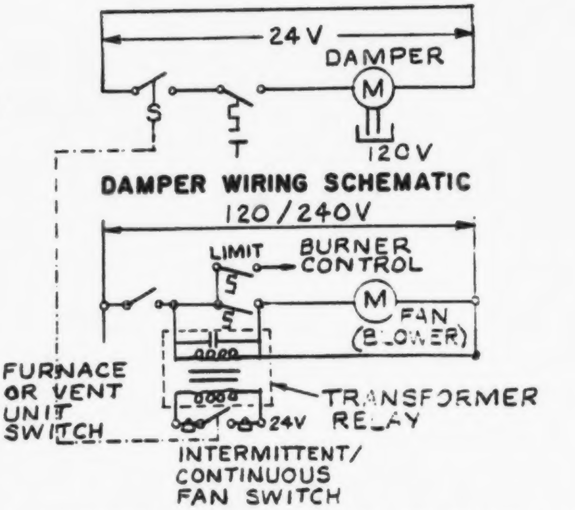
CONTINUOUS/INTERMITTENT FAN SWITCH


E/A
R/A
VENT OR FURNACE CONTROL
S/A
90%
NEW SPLIT DAMPER
O/A
10%
15°C DAMPER OPEN WHEN T > 15°C
T
FURNACE OR AIR HANDLING UNIT
SUMMER 12°C
SUMMER/WINTER SWITCH (OFF IN WINTER)
VENTILATION SWITCH (2PST) IN MAIN OFFICE
NEW

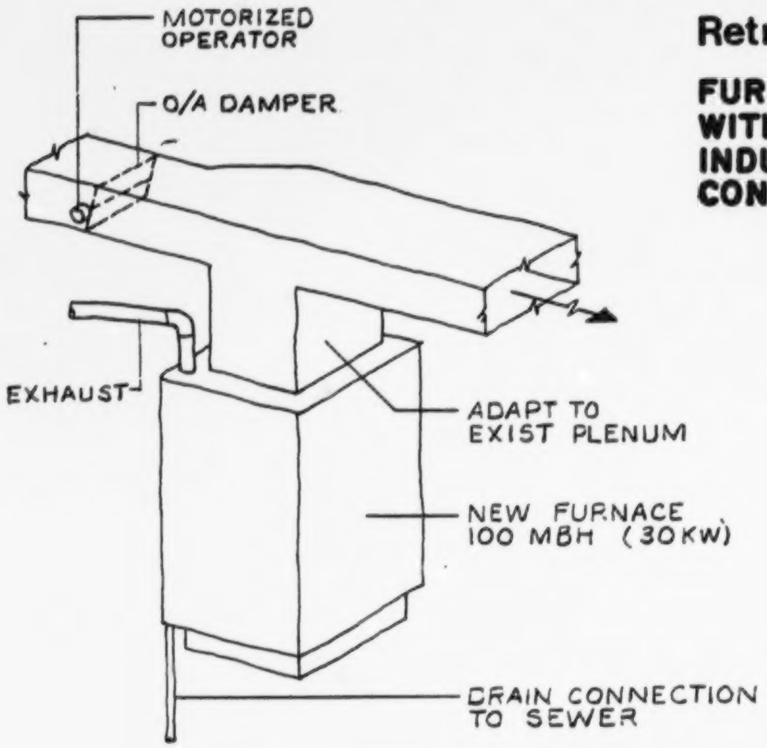
NOTES. O/A SWITCH ON IN WINTER PERMIT 10% MIN. OUTSIDE AIR & WHEN OFF ZERO % OUTSIDE AIR NO MINIMUM POSITION ON O/A DAMPERS.

Unit Cost (1985)	
Damper Controller & Hook Up	900
Vent Switch	200
30% O & P + 30% NF	760
Total	$1850 *
UNIT ENERGY SAVING	502/y
UNIT POWER SAVING	409/y
UNIT FUEL SAVING	1221 l/y
PAY BACK PERIOD	2.0 yrs.

* 30 KW UNIT


24V
DAMPER
M
S
T
120V
DAMPER WIRING SCHEMATIC
120/240V
LIMIT
BURNER CONTROL
S
S
M
FAN (BLOWER)
FURNACE OR VENT UNIT SWITCH
TRANSFORMER RELAY
24V
INTERMITTENT/CONTINUOUS FAN SWITCH

REMOTE FAN SWITCH WIRING SCHEMATIC


MOTORIZED OPERATOR
O/A DAMPER
EXHAUST
ADAPT TO EXIST PLENUM
NEW FURNACE 100 MBH (30KW)
DRAIN CONNECTION TO SEWER

Retrofit Option 15

FURNACE REPLACEMENTS WITH HIGH EFFICIENCY INDUCED DRAFT HOT AIR CONDENSING FURNACES

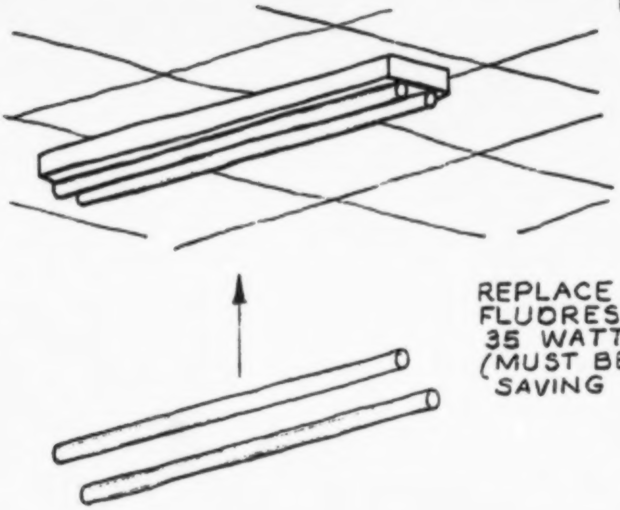
SEE VENTILATION UNIT 100% OUTSIDE AIR SHUT OFF & CONTINUOUS/ INTERMITTENT FAN SWITCH RETROFIT OPTION WHICH IS NOT INCLUDED IN FIGURES BELOW

Unit Cost (1985)	Propane	Oil
Furnace (C.F.)	2300	2800+
Misc. Material	240	800
Installation	800	240
Propane System	2000 +	--
Sub Total	5340	3840
+ 30% O & P + 18% NF	2830	2050
	8170	5890
UNIT ENERGY SAVING	575 *	575
UNIT MAINTENANCE SAVING	500	--
Total	1075/y	575
UNIT FUEL SAVING	1398 l/y	1398l/y
PAY BACK PERIOD	7.6 yrs.	10.2 yrs

* 20%, + 1000 gal tank, vaporizer & Hook up
+ estimate (not CSA at time of printing)

Retrofit Option 16

RELAMPING FIXTURES WITH ECONO-WATT LAMPS



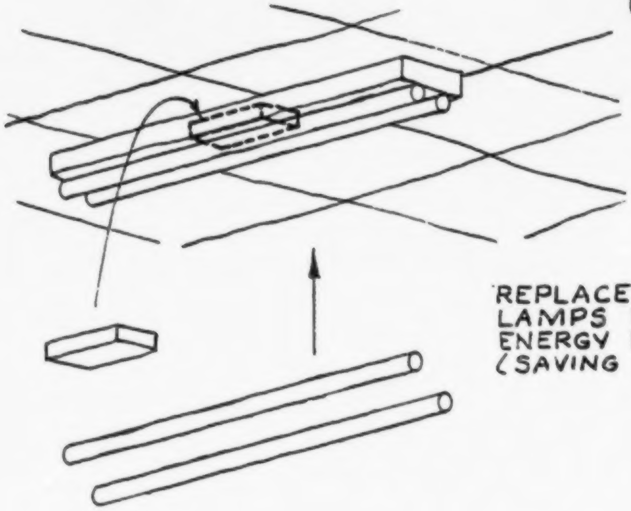
REPLACE BOTH 40 WATT FLUORESCENT LAMPS WITH 35 WATT ECONO-LAMPS. (MUST BE DONE IN PAIRS SAVING 5 W/LAMP.)

Group Replacement Unit Cost (1985)	
Materials	1.95
Labour	1.95
30% O & P & 30% NF	2.69
Total	$6.59
ENERGY SAVINGS	$3.92/yr
POWER SAVING	10 kw/yr
PAYBACK PERIOD	1.7 years

Replace Old Lamps On Failure	
Unit Costs (1985)	
Materials	1.95
30% O & P & 30% NF	1.35
Total	$3.30
ENERGY SAVINGS	$3.92/yr
POWER SAVING	10 kw/yr
PAYBACK PERIOD	1 year

Retrofit Option 17

REPLACE BALLASTS & LAMPS WITH HIGH ENERGY EFFICIENCY UNITS

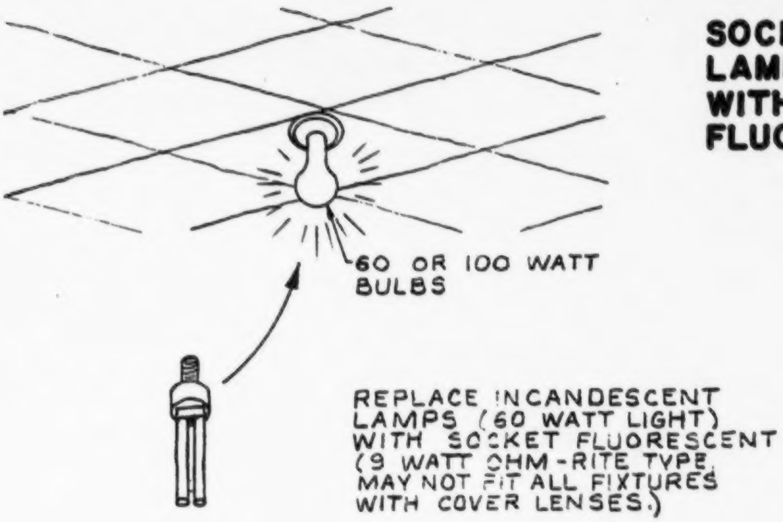


REPLACE BALLAST & TWO
LAMPS WITH HIGH
ENERGY EFFICIENT UNITS
(SAVING 9 WATTS/LAMP)

Unit Costs (1985)	
Materials	28
Labour	17
30% O & P & 30% NF	31
Total	$ 76
ENERGY SAVINGS	$ 14.1/yr
POWER SAVINGS	36 kw/y
PAYBACK PERIOD	5.4 years

Retrofit Option 18

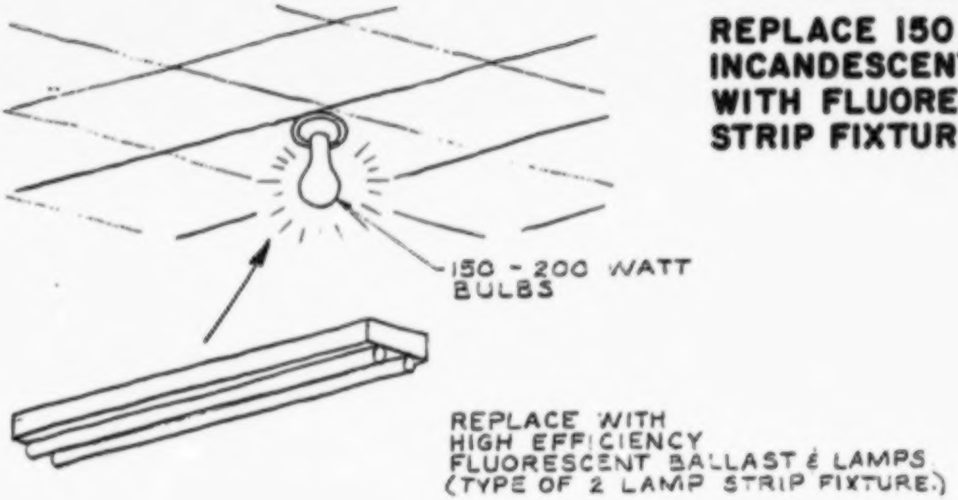
SOCKET INCANDESCENT LAMPS REPLACED WITH SOCKET FLUORESCENT LAMPS


60 OR 100 WATT BULBS
REPLACE INCANDESCENT LAMPS (60 WATT LIGHT) WITH SOCKET FLUORESCENT (9 WATT OHM-RITE TYPE, MAY NOT FIT ALL FIXTURES WITH COVER LENSES.)

Unit Costs (1985)	
Materials	25
Labour	--
30% O & P & 30% NF	17.25
Total	$42.25/unit *
ENERGY SAVING	$40/y†
POWER SAVING	102 kw/y
PAYBACK PERIOD	1 year
* Life Expectancy, 10,000 hours or 5 years	
†Estimated Saving	$23/y/unit/5y

Retrofit Option 19

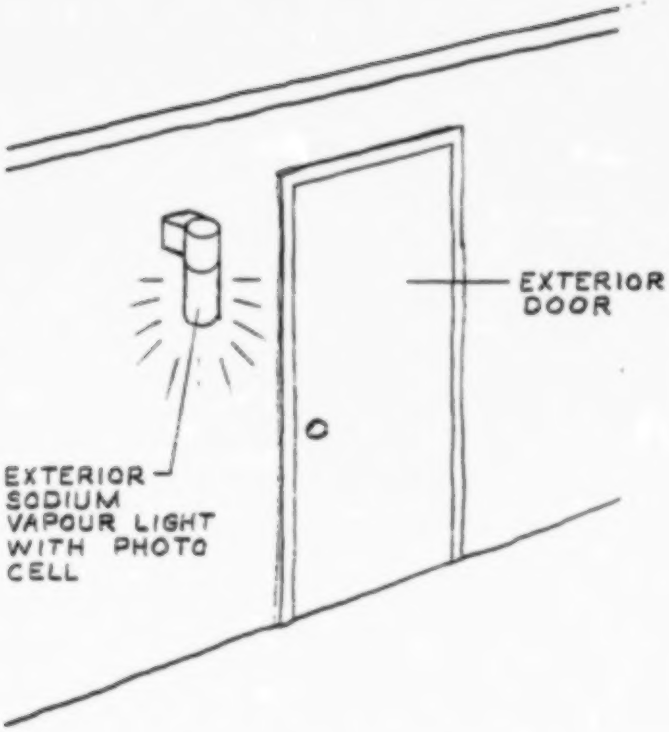
REPLACE 150 WATT INCANDESCENT LIGHTS WITH FLUORESCENT STRIP FIXTURES


150 - 200 WATT BULBS
REPLACE WITH HIGH EFFICIENCY FLUORESCENT BALLAST & LAMPS (TYPE OF 2 LAMP STRIP FIXTURE.)

Unit Cost (1985)	
Material	30
Labour	22
30% O & P & 30% NF	36
	$88/unit
ENERGY SAVING	$63/y
POWER SAVING	160 kw/y
PAYBACK PERIOD	1.4 y

Retrofit Option 20

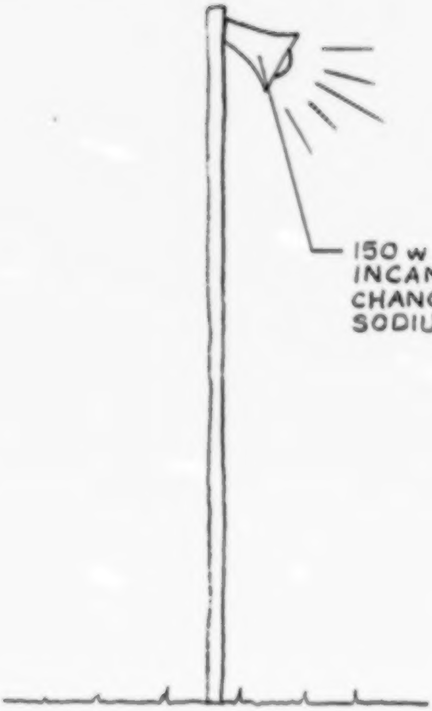
CHANGE EXISTING EXTERIOR INCANDESCENT FIXTURES TO SODIUM VAPOUR


EXTERIOR DOOR
EXTERIOR SODIUM VAPOUR LIGHT WITH PHOTO CELL

Unit Cost (1985)	
Material	133
Labour	22
30% O & P & 30% NF	106
ENERGY SAVING	$ 84/y
POWER SAVING	215 kw/y
PAYBACK PERIOD	3.1 yrs

Retrofit Option 21

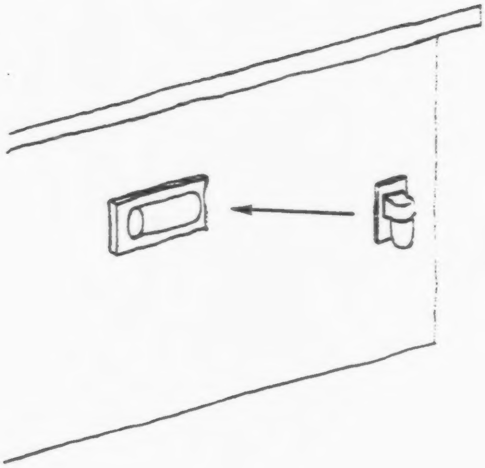
CHANGE EXISTING EXTERIOR PAR 150w FLOOD LIGHT TO 50w SODIUM VAPOUR


150w PAR
INCANCESENT
CHANGED TO 50w
SODIUM VAPOUR

Unit Cost (1985)	
Material	183
Labour	22
30% O & P & 30% NF	139
	344
ENERGY SAVINGS	$135/y
POWER SAVINGS	347 kw/y
PAYBACK PERIOD	2.5 yrs

Retrofit Option 22

CHANGE EXISTING 250W MV TO 100W HPS LAMP

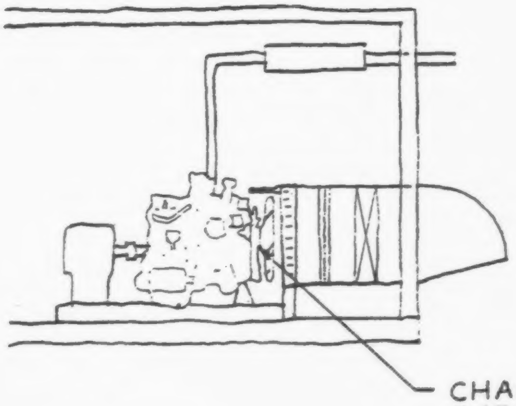


SUBSTITUTE 50W/HPS
FOR EXISTING 250W/MV
FIXTURES FOR 40%
LIGHTING LEVEL

Unit Costs (1985)	
Material	133
Labor	22
30% O&P+30% NF	106
Total	261
Energy Saving	286
Power Saving	730 KW/yr.
Payback period	1 year

Retrofit Option 23

CONVERT DIESEL GENERATOR SET DIRECT DRIVE COOLING FANS TO ELECTRIC CLUTCH CONTROL



CHANGE DIRECT DRIVE SHEAVE TO ELECTRIC CLUTCH (EATON TYPE.) THERMOSTATIC CONTROLLED DRIVE.

UNIT COST (1985)	
Materials	3000
Labour	1500
TOTAL	$ 4500
UNIT ENERGY SAVING	$ 3517/y*

$$\frac{\text{Fan HP x (100-LF\%)}}{\text{Gen Rating x LF}} = \%\ \text{Saving}$$

UNIT FUEL SAVING	8670 l/y
UNIT PAYBACK	1.3 y

*75 KW@0.3 LF Example

4.0 ALTERNATE FUEL RESOURCES/TECHNOLOGIES

4.1 Introduction

The opportunity to use renewable or alternate fuels in the northern communities designated in this study offers possible advantages to the resident and responsible governmental agencies.

In order to assess which option offer clear advantages to a community or specific buildings in that community this study has employed a standard set of evaluative criteria by which each option is analyzed.

These criteria are:

1. Resource availability
2. Status of the technology
3. Fuel "quality" required
4. Efficiency of fuel use
5. Environmental acceptability
6. Flexibility of operation
7. Suitability of resource/technology for heating system use
8. Economics

Those resources/technologies which rank highly in the evaluation have been considered in greater detail with respect to potential application to specific communities in Northern Saskatchewan.

4.2 Solar Energy

4.2.1 Resource Availability

The communities in this study are situated between the 55 degree North and 60 degree North latitudes. The irony of this energy resource is that when it is least available it is most needed - winter. The following example clearly demonstrates the inadequacy and cost ineffectiveness of this energy resource when compared to the heating requirements of the buildings in the north.

Eg: Stony Rapids Health Clinic

1. Size of building - 338 m2 (3638 ft2)
2. Amount of heating fuel used (1983/84) - 17,802 L (3956 gal)

3. Annual cost of fuel (1983/84) - $7,356
4. The average daily heat loss of the building in February is 471,000 watts, which is equal to burning approximately 45L (10 gal) of #2 Fuel Oil
5. The average solar energy is 4330 watts/m2/day available in February (February is the month for which most solar collector systems are designed)
6. Solar systems are not 100% efficient. Therefore, assume an average efficiency of 70%
7. The current installed cost of solar collector systems in southern Canada is about $450/m2. For the north a factor of 0.5 should be added which would bring the cost to about $675/m2.
8. The size of the collector system will be such that it will provide only about 70% of the total annual space heating requirement
9 Therefore, to provide the clinic with solar heat on a daily basis would require 155 m2 of collector

$$\frac{\text{Total daily heat loss}}{\text{Solar energy captured}} = \text{m2 of collector}$$

$$\frac{\text{471,000 Watts}}{\text{4330 Watts x .7}} = \frac{471{,}000}{3031} = \text{155 m2}$$

10. The capital cost for this collector system would be:

    155 m2 x $675/m2 = $104,625

11. Capital costs associated with the heat storage system and maintenance costs are not included in the estimate.

Conclusion

Since the solar energy available in the north is limited by short daylight hours and a low altitude angle, it is not presently a feasible alternative given the high capital costs of collectors. This technology also requires a skilled person locally to operate and maintain the system. Thus solar energy is not an attractive alternative nor a significantly available resource in the north.

4.3 Wood

4.3.1 Resource Availability

Wood is generally available to the communities of Northern Saskatchewan. In fact, many homes in remote communities use wood for cooking and heating. Detailed resource information is available for some of the communities which shows that a more than adequate wood supply is available.

Other communities however, have only rough estimates for available wood resources. It would, therefore, be necessary to do a wood survey of each area to ascertain the amount of fuel wood available in these other communities before any new large scale user of wood was established.

Availability of Wood for each Community

4.3.1.1 Black Lake

Little detailed data is available on the forest resources around Black Lake. The area to the northwest of the community and south across to the lake is an extensive fireburn.

The burn area surrounding the community stretches west from the Stony Rapids/Black Lake Road. The area east of the road is mature forest, untouched by the forest fires that occurred in the area, some ten years ago. Partially burned or scarred and standing jackpine is the major wood available in the burn areas. Some green wood is also harvested in the forests to the north of the community.

There appears to be plenty of wood available around the community to satisfy household heating requirements over the long term. Further study is required to determine if wood is available in sufficient quantites to sustain an additional wood consumer such as if the school converted to a wood chunk or chip heating system.

4.3.1.2 Brabant Lake

Research by Saskatchewan Power indicates that the wood reserve within a 19 km radius of Brabant Lake is about 700,000 cords. The settlement is also in the centre of an old fire burn.

Saskatchewan Power has estimated the additional wood mass, (available within a 19 km radius of Brabant Lake) of tops and foliage to be:

Foliage: 60,000 - 120,000 cords
Tops: 40,000 - 100,000 cords.

Saskatchewan Power has concluded that more than adequate wood resources exist in the area surrounding Brabant Lake to sustain existing local consumption, conversion to the larger buildings to wood and a wood gasification electrical generation plant for the community

4.3.1.3 Camsell Portage

Camsell Portage is heavily wooded with mature softwoods. No firm estimates of volume are currently available. However, long term supply for local heating purposes is more than adequate.

Further study would be required to determine if wood is available in sufficient quantities to sustain a larger consumer. The rocky terrain surrounding the community would impede traditional harvesting techniques.

4.3.1.4 Deschambault Lake

A Saskatchewan Power study indicates that a wood reserve of about 2 million cords exists within a 19 km radius of Deschambault Lake. Hardwoods make up 22% of the reserve, with aspen and birch being the predominant species. Softwoods make up the balance, with the major species being black spruce, jackpine and white spruce.

Estimates of wood mass volumes associated with foliage and tops are:

Foliage: 140,000 - 280,000 cords
Tops: 100,000 - 230,000 cords.

A small sawmill periodically operates in the community to provide local building materials.

Saskatchewan power has concluded that a sufficient supply of wood exists to supply fuelwood for a gasification plant of a sufficient size to supply local power needs over a 50 year period.

4.3.1.5 Fond Du Lac

Wood reserves in the area surrounding Fond du Lac are considered more than adequate to satisfy current demand over the long term. Detailed forest inventory data is not available however, the dominant species in the area are jackpine and spruce, with scattered occurences of birch, aspen and tamarack. The Department of Northern Saskatchewan estimated that reserves are in the order of 2.5 - 17 cords per hectare. Based on a 19 km radius, standing wood reserves of 289,000-2,025,000 cords can be expected to be available in the vicinity of the community.

4.3.1.6 Garson Lake

To the north of the community, the land is poorly drained, treed muskeg. To the south of the community is a large stand of mature timber of merchantable size (over 9 m in height) with the predominant species being jackpine and black spruce.

At present, Garson Lake is highly dependent on wood as a fuel resource. All homes are heated 100% with wood, and the school utilizes combined wood/oil space heating. Inexpensive fabricated tin stoves are used in all dwellings for heating and cooking.

Wood resources in the area are plentiful and more than enough to sustain a growing population, or a wood gasification system.

4.3.1.7 Kinoosa

No detailed information is available on the forest reserves surrounding this community. However, Saskatchewan Power has made a tentative estimate of wood volumes. This esimate ranges from 0.3 to 2.0 million cords within a 19 km radius of the community. Major species are jackpine, black spruce , aspen, birch and tamarack.

The majority of homes in Kinoosao heat with wood for economic reasons.

4.3.1.8 Southend

The standing wood reserves within a 19 km radius of the community of Southend are about 400,000 cords. Hardwoods make up about 19% of this reserve with the remaining being softwoods.

Estimated wood mass volumes available from foliage and tops are as follows:

Foliage: 30,000-60,000 cords
Tops: 25,000-50,000 cords

While some residents do have relatively modern wood burning equipment, the majority of residents in the community utilize woodstoves made of tin.

Saskatchewan Power has estimated that if a gasification plant were designed to generate electricity for the entire community for fifty years, this would consume about 19% of the standing reserves with a 19 km radius.

4.3.1.9 Stony Rapids

Little detailed data is available on the forest resources around Stony Rapids. Directly south, and throughout the community, is an extensive burnout area that extends to a portion of the shore of Black Lake. The eastern perimeter of this burnout area is the road connecting the communities of Blake Land and Stony Rapids. Partially burned or scarred jackpine is the major wood available in the burnout areas.

Stony Rapids has been utilizing standing fire kill material from this area for about the last 8-10 years. As a result, while plenty of wood is available, residents must travel increasingly farther from the community and service roads. Very significant long term wood resources remain in the extensive burn area. More detailed study would be required to assess the ability of the wood resource base to support an additional large scale wood consumer.

4.3.1.10 Wollaston Lake

No detailed information is available on the wood reserves of Wollaston. Saskatchewan Power has made a very general estimate that 300,000 - 2,000,000 cords are available within a 19 km radius of the community. Major species found in the area are jackpine, black spruce, birch, aspen and tamarack.

The vast majority of homes in Wollaston utilize tin woodstoves for home heating. Green, freshly cut wood is burned in all cases.

4.3.2 Status of the Technologies

Wood can be burned as wood chunks, wood chips or it can be gasified and the gas burned.

Status:

Burning wood chunks - Proven-many people use wood stoves or airtight heaters. Commerically available.

Burning Wood Chips - Demonstration Phase

Burning wood gas - Prototype stage

4.3.3 Fuel Quality Required

Wood Chunks - Trees cut and split. Dried to 30% moisture content or below.

Wood Chips - Trees cut into lengths then chipped into 12 mm x 12 mm x 3 mm size and dried to 20% moisture content or below.

Wood Gas - Wood must be cut, chipped and automatically fed into gasifier. The gas is 'dirty' and must be cleaned by a scrubber. This gas can then be used to fuel an engine.

4.3.4 Efficiency of Fuel Use

Wood Chunk Burners - 30 - 70%
Wood Chip Burners - 60 - 70%
Wood Gasification - 70%

4.3.5 Environmental Acceptability

Wood Chunk - produces smoke
Wood Chips - less smoke
Wood Gasification - quite clean

4.3.6 Flexibility of Operation

Wood Chunks- Stoves must be fueled every two to twenty-four hours.

Wood Chip - A stoker fired system is thermostatically controlled and starts the stoker motor so that fuel is fed into the fire. Once the thermostat is satisfied, the stoker shuts off and the fire dies down quickly. A small fire is maintained and acts like a pilot light on a gas furnace when the stoker is turned off. For maintenance, the fire quickly dies and few live coals remain. Hence shutdown times for maintenance are usually short with little interruption to building heat.

Wood Gasification- Operations are relatively automatic and the system can be started up quickly.

4.3.7 Suitability for Use in Heating Systems

Wood Chunk - in wide use now.

Wood Chip - Furnaces coupled to a stoker can be as easy to operate as an oil furnace. The stoker can be attached to a large bin or supply of dry wood chips and then can be fed into the furnace by thermostatic control. Additionally a stoker fired furnace can be attached to many types of existing heat distribution systems.

Wood Gas - Not suitable - technology is not developed. Fuel quality is not sufficient for space heating application.

4.3.8 Economics

To ensure a reliable supply of wood will be available, the community could establish a wood dealer. This may be run as a small business or as a co-operative. It is important that the wood is harvested economically and efficiently so that the cost per cord is kept at a reasonable price.

Wood Chunk- very economic in areas where other fuels are expensive and where the cost of cutting and transporting wood is not accounted for as on a normal marketing basis.

Wood Chip- same as for wood chunk.

Wood Gasification - This technology is not directly suited to the heating of buildings but rather as an alternate to diesel fuel in the production of electricity.

See Table 4.1 for a detailed cost analysis on four northern communities with an assured wood supply.

4.3.9 General Conclusions

Wood chunk technology is proven, reliable, and economic. More recently developed air tight wood stoves and wood furnaces are widely available and are much more efficient for burning wood.

Wood chip technology is a recently proven technology which needs to be demonstrated in regional areas in order to be acceptable. Local variables will affect the overall acceptability in a specific applications.

Wood gasification technology is still in the prototype phase and is being applied only to the production of electricity.

The limiting factor in using any wood fueled system will be securing a reliable supply of wood in the appropriate form required (such as wood chunks dried to 30% moisture content.) Also in the operation of the systems which will require an active participation by the end users.

TABLE 4.1

A PRELIMINARY COST COMPARISON OF ANNUAL HEATING OIL COSTS WITH CAPITAL COST AND ANNUAL FUEL WOOD COSTS FORFOUR NORTHERN COMMUNITIES WITH AN ASSURED WOOD SUPPLY

COMMUNITY	BUILDING	FLOOR AREA (M2)	ESTIMATED ANNUAL FUEL OIL REQUIREMENT (L/YEAR)	ESTIMATED ANNUAL FUEL OIL REQUIREMENT ($1984)	ESTIMATED ANNUAL FUEL WOOD REQUIREMENT (CHIPS/YR) (M3)	ESTIMATED ANNUAL FUEL WOOD REQUIREMENT (CORDS/YR)	ESTIMATED ANNUAL FUEL WOOD COSTS ($) ($82/CORD)	TYPE OF WOOD SYSTEM	ESTIMATED CAPITAL COST ($)
Brabant Lake	School	797	22,000	9,276	218	82	6,724	Wood/Oil	INPLACE
	Teacherages	89	6,000	2,500	61	23	1,886	Wood Stove	3,300
Deschambault Lake	School	2,242	57,000	22,600	561	211	17,302	Wood Chip	20,800
	Teacherages(6)	421	20,600	8,200	205	77	6,314	Wood Stove	9,900
	Comm. Hall	178	8,900	3,500	88	33	2,706	Wood Chip	6,600
	Comm. Rink	186	33,700	13,400	332	125	10,250	Wood Chip	9,300
	Health Clinic	173	16,500	6,500	165	62	5,084	Wood Chip	7,000
Fond Du Lac	Band Office, Hall & Clinic	577	35,000	16,100	346	130	10,660	Wood Chip	15,800
	School, Class-rooms & Mini Gym	958	176,600	80,900	1,741	655	53,710	Wood Chip	35,000
	Teacherages(4)	505	41,600	19,000	409	154	12,628	Wood Stove	6,600
Southend	School & Kindergaren	276	78,200	32,800	771	290	23,780	Wood/Oil	5,300
	Comm. Hall	294	8,900	3,700	88	33	2,706	Wood/Oil	3,200
	Teacherages(2)	140	4,500	1,900	45	17	1,394	Wood Stove	3,300
	Health Clinic	241	24,700	10,400	245	92	7,544	Wood/Oil	3,700
	Lac Office	48	10,900	4,600	109	41	3,362	Wood Stove	1,700
	Lac Hall	131	2,500	1,100	27	10	820	Wood/Oil	3,200
	Band Office	112	6,400	2,700	64	24	1,968	Wood Stove	1,700
	DNS Warehouse	178	7,500	3,200	74	28	2,296	Wood/Oil	3,200

NOTES:

1. ONE CORD OF WOOD = 270 L OF #2 HEATING OIL (based on a higher heating value of one cord = 10.6 GJ)

2. The cost of one cord of wood was assumed to be $82/cord. This is based on $58/cord to bring the wood into the yard including bucking and stacking. This estimated cost was obtained from the Saskatchewan Timber Board and is based on using large mechanized equipment. The remaining cost per cord is to cover the additional labour required to charge and clean the wood furnaces (4.8 hrs/cord @ $5/hr). In a study done under RCDP for The Council of the Northern Settlement of Brabant Lake prepared by Bell, Ahenakew and Associated and The Saskatchewan Research Council the study team cut, bucked, transported and stacked one cord of wood to determine total machine costs and total layout. The resulting cost for operating, maintaining and amortizing capital investment of one chain saw and two snow machines was $9.97/cord. The labour cost required was 8 man hours/cord at $5/hr or $40/cord. Thus a total cost of $74/cord which includes the additional labour for charging and maintaining the wood furnace is derived from these figures suggesting a value of $82/cord base on $5/hour labour cost is representative.

Table 4.2

A Summary of Wood Heating Appliance Costs

All costs are estimated based on retail 1984 prices. A factor of 0.5 was added to account for any additional expenses which may be incurred due to a communities' remote location.

Wood Stove to heat up to 1800 sq. ft. Installed cost $1,650 (maximum 20 hour burn)

Furnaces up to 25 kW/hr = 75,000 (Btu/hr) (maximum 36 hour burn)

Wood	$3,100	
Wood/Oil	$3,150	
Wood Chip	$6,650	(includes Stoker Bin)

Furnaces up to 30 kW/hr = 100,000 (Btu/hr)

Wood	$3,600	
Wood/Oil	$3,650	
Wood Chip	$7,200	(includes Stoker Bin)

Furnaces up to 60 kW/hr = 200,000 (Btu/hr)

Wood	$5,200	
Wood/Oil	$5,300	
Wood Chip	$9,800	(includes Stoker Bin)

Furnaces up to 200 kW/hr = 660,000 (Btu/hr)

Wood Chip	$25,000	(includes bin & stoker)

Furnaces up to 700 kW/hr = 2,500,000 (Btu/hr)

Wood Chip	$50,000	(includes bin & stoker)

Wood Chipper Costs Approximately:

$11,000 (This will service one community as it will produce 3 tonnes or chip 1.9 cords per hour)

Estimate costs of cord wood:

This is difficult to estimate, and can range from $10/cord with no labour to $100/cord. For use in this study $82/cord was used as an average cost.

4.4.0 Wind

Wind can be a significant source of energy. However, in many areas the wind is not consistently available. During the northern winters the prevailing westerly winds slip south resulting in a long periods of calm. Wind characteristics are site specific and are influenced by the local topography. Performance is best if the wind power system is situated at the summit of a ridge or the peak of a hill. Also, a valley that lines up with prevailing winds can be effective in channeling the wind and thereby maximizing power.

4.4.1 Resource Availability

Black Lake

Further investigation of the microclimatic factors surrounding the community (including significant topographical features), would be required to establish the potential for wind at this site. The closest weather station that is able to monitor wind characteristics in the area is at Uranium City.

Brabant Lake

No wind information is currently available.

Camsell Portage

Very little data is available on the wind characteristics of this location. Data has been collected at Uranium City since 1959. The mean annual wind speed for Uranium City is 12.2. km/hr which would indicate a generally low potential for wind power. In addition, high frequency of calm periods during the winter months (20.0% in January; 18.5% in February) further reduces the attractiveness of wind power. It should be noted that two significant topographical features, Lake Athabasca and the series of hills to the north of Camsell Portage, may influence wind characteristics in the area positively. Further investigation is required.

Deschambault

Further investigation and monitoring of the site is necessary to determine the potential for wind at Deschambault Lake, The community, because it is situated on a peninsula in the centre of Deschambault Lake, does have potentially good locational characteristics.

Fond du Lac

Further investigation of microclimatic factors and significant topographical features surrounding the community would be required to establish the potential for wind.

Garson Lake

No data is currently available on wind characteristics.

Kinoosao

No data is currently available on wind characteristics.

Southend

No data is available on wind characteristics at this site, however, in a report prepared by SPC, a site, 11 km south of the community, on Big Island , was identified as a location where topographical features could be condusive to wind power utilization.

Stony Rapids

Further investigation of microclimatic factors and significant topographical features surrounding the community would be required to establish the potential for wind at this site.

Wollaston Lake

No data is presently available on the wind characteristics at this site. In a report prepared for Saskatchewan Power by the Saskatchewan Research Council, a site 800 m west of the south end of the airport, on a hill overlooking Wollaston Lake, was identified as having site characteristics favourable to wind power utilization.

4.4.2 Status of the Technology

There are two types of wind generating systems that are available and have been tested:

Darrieus Rotor - is a vertical axis turbine. These rotors are in the demonstration stage of development. Saskatchewan Power has been testing a 50 kW unit in Swift Current since 1979. After overcoming inital design problems the unity has operated successfully in the automatic unattended mode for over a year. During 1983 the turbine produced approximately 30,000 kWh of electricity.

Horizontal Axis - Proven. Many people have or use a wind turbine for their energy needs. A number of designs are commercially available. Many generators have been improved upon and are fairly reliable.

4.4.3 Fuel Quality Required

Not all winds are energy winds, that is, a gusty or low velocity wind will not produce any energy. To obtain power from the wind turbine a steady wind with a velocity of approximately 16 kph to 40 kph is necessary. In order to ensure that the proposed site has adequate wind quality the site should be monitored for at least 3 years.

4.4.4 Efficiency of Fuel Use

Wind generator efficiency depends largely on the turbine design. Generally, a wind generator has a maximum efficiency of about 40%.

4.4.5 Environmental Acceptability

Wind generators have a very minimal environmental impact. They do produce some noise but do not produce any air pollutants. It may be necessary to locate the wind tower in a clear area in which case some trees may have to be cleared.

4.4.6 Flexibility of Operation

Energy is only available when the wind is blowing. In order that energy can be available on a demand basis storage is required. For a space heating application the excess electricty produced might be used to heat water which is then stored until heat is required. Otherwise, battery banks must be used. Connection with the local grid system is also a method of storage. Excess electricity is fed into the system then when power is required and the wind is not blowing, electricity is used from the local grid system. This, however, may not be compatible with the small generating systems in these communities.

4.4.7 Suitability of Resource/Technology for Heating System Use

A wind generating system can be designed that would be suitable for space heating. This type of system has not been widely applied and would require careful planning and initial monitoring to ensure that the system functions reliably. Also, unless the wind characteristics showed that the winds were consistently reliable it would be necessary to have a back up heating system.

4.4.8 Economics

Eg. Stony Rapids Health Clinic

1. Size of building - 338 m^2(3638 ft.^{2})
2. Amount of heating fuel used (1983-84) is 17,802 L (3956 gal.)
3. Annual cost of fuel (1983-84)= $ 7,356.
4. The average daily heat loss of the building is 471,000 watts which is equal to burning approximately 45 L (10 gal.) of #2 fuel oil.
5. Therefore the average hourly heat loss is 19,625 W/hr.
6. There are 25,000 W wind furnace generators available which cost approximately $34,000. However, this does not include cost of tower, batteries (or other storage medium) shipping and installation.
7. Wind requires 100% heating backup or else it could be used to supplement the present heating system.
8. The cost of a tower is approximately $3,300. To obtain costs for installing and shipping generator and tower in the north a factor of 0.5 was added which brings the total cost to approximately $55,950.
9. Providing the wind blows consistently the 25,000 W wind furnace could supply heat. However, it is unlikely that the wind will blow consistently over the winter season. Therefore, battery storage will be necessary. This raises the initial investment significantly.

4.4.9 Conclusion

Currently, wind energy is not a technology which can be appropriately applied for space heating purposes in the North.

4.5 Small Scale Hydro

Resource Availability of Micro Hydro Within 16 Km of Each Community

Black Lake

Elizabeth Falls Site

This site is 4 km from the community; the minimum flow is 180 m^3/s with a potential generating capacity of 51 MW. However, this site is considered a significant natural feature and tourism resource. The area may also be of archaeological significance.

Woodcock Rapids

This set of rapids has a minimum flow of 127 m^3/s and a firm generating capacity of 28 MW. There appears to be minimal environmental impact according to SPC preliminary assessments, however it is not identified as being economically viable.

Brabant Lake

Waddy River

Just north of the settlement the river has a 29 m drop over 7 km from lower Waddy lake to Brabant Bay. Minimum water lows are unknown and further investigation is needed.

Chartier River

Southwest of Brabant Lake it has a 30 m drop over 12 km from Wierzycki Lake and Brabant Lake. Stream flow data is unavailable for this site.

Camsell Portage

White Lake Dam

This is an existing hydro power station 14 km east of Camsell Portage.

Charlot River

There are a number of rapids and a significant drop in elevation below the White Lake Dam. Development is unlikely, given the proximity to existing hydro-electric developments.

Deschambault Lake

One potential site has been identified about 30 km from the community but a detailed study of flow rates between Pelican Narrows and Deschambault Lake is needed.

Fond du Lac

Warwick Rapids

Located on Bulya River 2 km before emptying into Lake Athabasca. The river drops about 5 m over a 2 km stretch. No flow data for this site exists.

Bulya River

This site is about 10 km north of the settlement. At this site the river drops dramatically over a 15 km stretch.

Both of these sites would require further investigation.

Garson Lake

No significant sites within a 16 km radius.

Kinoosao

No significant sites within a 16 km radius.

Southend

Whitesand Dam

This site is 13 km southwest of the community and the average flow is 192 m^3/s with a 6 m head and a firm generating capacity of 5.6 MW. This existing dam offers good potential for utilization of small hydro technology.

Devil Rapids

Is located 16 km from Southend and is downstream of Whitesand Dam. Flow rates are probably similar to Whitesand Dam - 192 m^3/s. The head at this location is not known.

Stony Rapids

Woodcock Rapids

This set of rapids has a minimum flow of 127 m^3/s and a firm generating capacity of 28 MW. According to Saskatchewan Power's preliminary assessment, further investigation is required.

Wollaston
No significant sites within a 16 km radius.

4.5.2 Status of Technology

The technology for hydro is proven. Capturing energy from rushing streams is well established. There are several commercially available turbines for mini and micro hydro applications.

4.5.3 Fuel Quality Required

The minimum annual water flow must be sufficient to produce the electrical power demands of a building or a community.

4.5.4 Efficiency of Fuel Use

The efficiency of the turbine to recover energy in the moving water depends on the turbines efficiency, length and drop of the penstock, the available head and the generator efficiency. Efficiency levels of 80% are common with this scale of hydroelectric facility.

4.4.5 Environmental Acceptability

There are a number of environmental issues to address before installing a hydro electric plant. They are:

- The effect of "ponding" on fish and other aquatic life
- The interference with fish movements
- The assurance that fish will not be sucked or dragged through the turbine.
- The physical and ecological consequences of changing the streams flow
- The maintenance of stream flow downstream from the project
- The impact on communities

4.5.6 Flexibility of Operation

Small scale hydro is subject to varying stream flow rates and water levels which may affect the electrical production capability of the system. Therefore, installations are sized to ensure that minimum stream flow rates will produce the required electrical output.

4.5.7 Suitability of Resource/Technology for Heating System Use

Due to the high heating loads in northern buildings it is not likely that a small hydro facility could be economically built to satisfy heating loads. Therefore, while this technology could be used to supplement or replace diesel plants it is not well matched to supplying space heat.

4.5.8 Economics

The following example is used to demonstrate that small scale hydro is uneconomical for an individual building use.

Eg. Stony Rapids Health Clinic

1. Size of building 338 m^2 (3638 $ft.^2$)
2. Amount of heating fuel used (1983-84) is 17,802 L (3956 gal.)
3. Annual cost of fuel (1983-84) = $7,356
4. Annual electrical requirement (1983-84) is 16,393 kmh
5. Annual electrical costs (1983-84) is $6,229.
6. The average daily heat loss of the building is 471,000 watts which is equal to burning approximately 45 L (10 gal.) of #2 fuel oil.
7. The average hourly heat loss is 19,625 w/hr
8. The estimated peak electrical load is 6000 w/hr
9. The total requirement is 26,000w/hr or 26kw/hr
10. The average cost of small scale low head hydro is quite high and can range from $4000 to $5000 per installed kilowatt. Costs can very significantly depending on the site. Also the costs per kilowatt are much lower with larger capacity systems.
11. The approximate cost to install a 30 kw system adding on a factor of 0.5 to take into account additional costs of shipping, and installing the system in the north is $225,000
12. This is not economically sound to replace $14,000 /annum fuel bills

4.5.9 Conclusion

Small scale hydro in Northern Saskatchewan does have potential as a possible replacement or supplement to diesel electric generation but economics mitigate against its use for widespread space heating purposes.

4.6 Peat

4.6.1 Resource Availability

At the present, mapped or recorded peat bogs are south of the Precambrian Shield. There is little indication that there are readily exploitable peat bogs in the Lake Athabasca region. However, the southern communities such as Garson Lake, Deschambault Lake, Brabant Lake and Southend may be close enough to accessible peat bogs to utilize this resource for space heating.

4.6.2 Status of the Technology

Peat fired furnaces - demonstration phase - furnaces from 10×10^6 BTU/hr to 50 x 106 BTU/hr have been used for commercial heating in Finland, Ireland and The Soviet Union. These furnaces are designed to generate steam or hot water for heating. Saskatchewan Energy and Mines funded a project which tested five different furnaces in homes at Buffalo Narrows. Three were imported from Europe and two were Canadian multi-fuel furnaces converted from oil/wood to oil/peat. These test results showed that generally the furnaces could produce heat safely and efficiently but would require further tests and modification.

4.6.3 Fuel Quality Required

Peat is mined from bogs and then dried into sods or processed into briquets. Not all peat is adequate for fuel. Peat is divided into eight different humidification levels (H 1 to H 8). Fuel peat must be H4 or greater to be suitable for energy purposes. The Saskatchewan peatlands in the Buffalo Narrows region has been verified as fuel peat bogs. Sod peat must be dried to at least 35% moisture content to burn efficiently in a furnace. Peat briquets require additional processing but do have superior combustion qualities. Regardless of the form that the peat is used as a fuel, the bogs must be drained and mined. This technology requires a substantial equipment investment necessitating a large scale user to make the process economically viable.

4.6.4 Efficiency of Fuel Use

Three important peat fired furnaces were tested by S.R.C. for efficiency under simulated load conditions in Prince Albert. The efficiencies ranged from 63.5% to 84%. Both of the furnaces were designed and built in Finland.

4.6.5 Environmental Acceptability

The dust accumulation around a peat-fired furnace is minimal however, air pollution from the stack or chimney is more significant. Burning peat does produce a distinct odour although in the Buffalo Narrows test the neighbours did not complain. The main cause for complaint was odours within the home. This is from smoke escaping during refueling which can be minimized or eliminated through proper operating procedures.

4.6.6 Flexibility of Operation

In the Buffalo Narrows study the two Canadian multi-fuel furnaces burning oil and peat tended to overheat during mild winter conditions. However, the imported multi-solid-fuel furnace seemed to have operated acceptably. These furnaces are manually fueled every 4 to 5 hours. Also it is necessary to remove ash and creosote on a regular basis. Generally the operation is similar to that of an airtight woodstove.

4.6.7 Suitability of Resource/Technology for Heating Systems Use

Before peat is used as a heating system it would be advantageous to test and demonstrate these heating systems on a wide scale so that problems of operation and owner use can be solved. Other than this the furnaces are fairly efficient and are not considered environmentally hazardous.

4.6.8 Economics

To burn peat requires a considerable capital investment to prepare and clear the bog and to purchase mining equipment.

In a study prepared by Bell and Associates and Monenco Limited titled, "An Examination of Alternative Sources of Energy For Deschambault Lake, Saskatchewan", a potential fuel bog was identified and costs of production were estimated. The minimum production was to be 5,100 tonne/year of sod peat. The following is a summary of the costs:

1.

Initial preproduction equipment cost estimate	$122,100
Preproduction Labour Cost Estimate	$200,000
(Note: preproduction includes site clearing and ditch digging)	
Production equipment capital cost estimate	$308,000
Estimate of capital cost of service facility	$197,000
Total Capital Cost	$827,100
Annual Operating Cost Estimate	$124,000

2. The Monenco study estimated that it would cost $48/tonne to mine and transport 5100 tonnes of peat
3. The heating value of the peat was tested and is 12,696 kJ/kg (5,460 BTU/lb)
4. The heating value of #2 oil is 38,400 kJ/L. The institutional buildings in Deschambault required approximately 137,000 L of #2 oil for heating.
5. This is equivalent to (in tonnes of peat)

$$\frac{137{,}000\text{L} \times 38{,}400 \text{ kj/L}}{12{,}696 \text{ kJ/kg}} = \frac{414{,}400 \text{ kg}}{1000 \text{ kg/tonne}} = 415 \text{ tonne}$$

6. To estimate capital costs of the heating systems it was assumed woodstoves or furnaces would be converted to peat. Therefore, the same prices were used as for the wood appliance listed in Table 4.2 with $500 added on to each woodstove and $1,000 onto each furnace to cover the cost of conversions.

See Table 4.3 for cost comparisons of using fuel peat for heating instead of oil.

TABLE 4.3

PRELIMINARY COST COMPARISON OF ANNUAL FUEL OIL COSTS

WITH CAPITAL COST AND FUEL PEAT COSTS

Location	Building	Floor Area (m2)	Estimated Annual Fuel Oil Requirement L	$	Estimated Annual Peat Requirement Tonnes	($48/tonnes)	Capital Cost of Peat Furnaces
Brabant Lake	School	797	22,000	9,276	70	3,360	4,000
	Teacherages	89	6,000	2,500	20	960	4,300
Total			28,000	11,776	90	4,320	8,300
Deschambault Lake	School	2242	57,000	22,600	160	7,600	21,800
	Teacherages	421	20,600	8,200	60	2,900	12,900
	Comm/Hall	178	8,900	3,500	25	1,200	7,600
	Comm/Rink	186	33,700	13,400	110	5,300	10,800
	Health Clin.	173	16,500	6,500	35	1,700	8,000
Total			136,700	54,200	390	18,700	61,100
Southend	School & Kindergarten	276	78,200	32,800	240	11,520	6,300
	Comm.Hall	294	8,900	3,700	30	1,400	4,200
	Teacherages	140	4,500	1,900	15	720	4,300
	Health Clin.	241	24,700	10,400	80	3,840	4,700
	LAC Office	48	10,900	4,600	35	1,680	2,200
	LAC Hall	131	2,500	1,100	10	480	4,200
	Band Office	112	6,400	2,700	20	960	2,200
	DNSWarehouse	178	7,500	3,200	25	1,200	4,200
Total			143,600	60,400	455	21,800	32,300

NOTES:

1. The fuel peat costs were based on the assumption that a suitable fuel bog is within the vicintiy of the community. Also that 5,100 tonnes of fuel peat are produced per year of which 500 tonnes are used by the institutional buildings. The remaining 4,600 tonnes of peat will have to be sold to residents in the community for heating fuel or to North Sask Electric for electrical generation. Capital costs are the costs of the heating systems only.

2. The fuel peat costs assumes that a suitable fuel bog is within the vicinity of Brabant Lake and Southend. So that both communities may use the fuel peat as they are joined by road. The mine will be capable of producing an excess of 4,200 tonnes which will have to be sold to residents for heating fuel or the North Sask Electric for electrical generation. Capital Costs are the costs of the heating systems.

TABLE 4.4

COMPARISON OF FUEL OIL, ELECTRICITY, WOOD AND PEAT AS HEATING FUELS

Community	Building	Floor Area (m 2)	Estimated Annual Fuel Oil Requirement (L/year)	Estimated Annual Fuel Oil Requirement $1984	Estimated Annual Electric Heat Requirement (kWh/year)	Estimated Annual Electric Heat Requirement ($)	Estimated Annual Fuel Wood Requirement (cords/yr)	Estimated Annual Fuel Wood Requirement ($) ($82/cord)	Estimated Annual Fuel Peat Requirement Tonnes	Estimated Annual Fuel Peat Requirement ($)
Brabant Lake	School	777	22,000	$ 9,276	30,000	6,500	82	6,724	70	$ 3,360
	Teacherages	89	6,000	2,500	36,000	1,000	23	1,886	20	960
Deschambault Lake	School	2,242	57,000	22,600	332,000	16,600	211	17,302	160	7,600
	Teacherages (6)	421	20,600	8,200	120,000	6,000	77	6,314	60	2,900
	Comm. Hall	178	8,700	3,500	46,000	2,300	33	2,706	25	1,200
	Comm. Rink	186	33,700	13,400	220,000	11,000	125	10,250	110	5,300
	Health Clinic	173	16,500	6,500	65,000	3.300	62	5.084	35	1,700
Fond Du Lac	Band Office, Hall & Clinic	577	35,000	16,100	205,000	10,250	130	10,660	—	—
	School, Class-rooms & Mini Gym	958	176,600	80,700	1,030,000	51,500	655	53,710	—	—
	Teacherage (4)	505	41,600	19,000	243,000	12,150	154	12,628	—	—
Southend	School & Kindergarten	276	78.200	32,000	455,000	22,000	290	23,780	240	11.520
	Comm. Hall	294	8,900	3,700	52,000	2,600	33	2,706	30	1,400
	Teacherages (2)	140	4,500	1,900	26,000	1,300	17	1,394	15	720
	Health Clinic	241	24,700	10,400	142,000	7,100	92	7,544	80	3,840
	LAC Office	48	10,900	4,600	64,000	3,200	41	3,362	35	1,630
	LAC Hall	131	2,500	1,100	15,000	750	10	820	10	480
	Band Office	112	6,400	2,700	37,000	1,700	24	1,968	20	960
	DNS Warehouse	178	7,500	3,200	44,000	2,200	28	2,296	25	1,200

NOTES:

1. The costs of fuel are based on prices quoted by fuel dealers as of November 15, 1984.
2. This is for comparison only and is to show that electric heat is economic providing the costs of electricity is $0.05/kWh. However, the present electric costs are as high as $0.39/kWh.
3. The costs of fuel wood is based on a cord of wood costing $82/cord.
4. The costs of fuel peat is based on $48/tonne of peat. This option would be uneconomic if the cost per tonne were greater than $130/tonne.

4.6.9 Conclusion

While peat furnaces are proven technology in Europe they would need further demonstration is Saskatchewan to find wide acceptance. A prime constraining factor in the wider use of this technology is the large capital cost of the mining and processing equipment. Peat could be economically attractive for use in the institutional buildings providing that the sods are produced for $48/tonne or less. However, to produce peat sods for $48/tonne, a large scale user would be necessary as the institutional buildings would only use a small portion of a viable peat sods production.

It is, therefore, likely that a peat mine would have to be established primarily for the production of electricity as electrical production would easily use 5100 tonnes of sod peats per year. Unfortunately the present cost of producing electricity from sod peats is not economical. A recent study prepared for the Deschambault Lake Hamlet Council showed that a peat-fired generation facility of about 500 kW would produce electricity at a total unit cost of about $0.58/kWh. This is much higher than the present total unit cost of diesel produced electricity.

Sources:
1. Saskatchean Energy and Mines Report No. OF 84-82-Buffalo Narrows Fuel Peat Demonstration Project.
2. Bell & Associates, Monenco Ltd. Report No. RCDP/PDCE-21, An Examination of Alternative Sources of Energy for Deschambault Lake, Saskatchewan

5.0 BUILDING ASSESSMENTS FOR ENERGY CONSERVATION MEASURES

This chapter includes the energy audit summary, retrofit recommendation and impact assessment for 93 buildings included in the study scope.

These are presented in an identical building survey format for the readers' convenience.

The first page outlines a description of the building, the responsible agency, and indicates the type of energy audit previously conducted on the building under the CEAP program. The energy audits are on file at the Energy Mines and Resources office in Saskatoon, Saskatchewan.

The second page summarizes the energy in and breakdown of energy lost as identified through the energy audits. These were field checked and adjusted in some cases.

The third page lists the recommended retrofit measures for the building, lists the retrofit costs, the projected energy and annual cost savings and identifies the individual item payback periods.

The fourth page indicates the energy saving impact of carrying out the retrofit recommendations.

The retrofit cost and respective energy savings are described in Chapter 3.0.

5. BUILDING SURVEY REPORT

BUILDING Teacherage
(old) Duplex #2
LOCATION Black Lake
Sask.
Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE Resident

CLASSIFICATION Residential
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 4
AGE OF BUILDING 15
LAST MAJOR RENOVATION DATES -

SIZE 138 **m2**
BEPI (ACTUAL) 1673
BEPI (TARGET) 768

BUILDING CONTACT PERSON:
NAME Dave Maynard
TITLE Acting Principal
PHONE 284-2166
PHOTOGRAPHS AVAILABLE YES X **NO** 2
NUMBER 2
DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

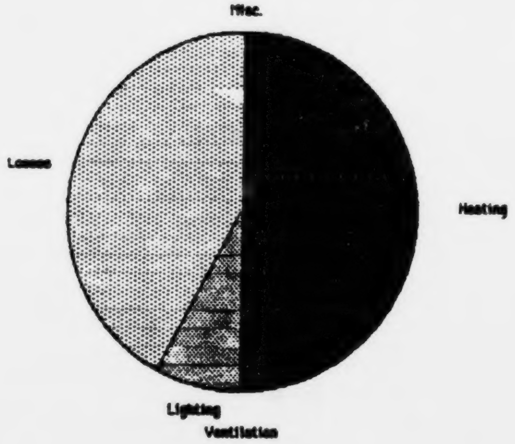
DESCRIPTION Wood frame, single story, gable roof joist on wooden grade beam, non accessable crawl space, hot water heated, wall fin radiation (No dampers for room zone control). Retrofit recommendations window vinyl film, ceiling insulation, temp set back stat, door weather stripping, dampers on L.R. wall fin

ENERGY BALANCE USAGE

BALANCE

ENERGY IN			ENERGY OUT		
FUELS	210	GJ Pro Rated	E.F.F. LOSSES	105	GJ
ELEC	21		HEATING	129	
SOLAR GAIN			COOLING		
			LIGHTING }	21	
			MOTORS }		
TOTALS	231	GJ			
			TOTAL OUT	225	GJ

TOTAL ENERGY CONSUMED	100%	231	GJ EST
WEATHER SENSITIVE PORTION OF ENERGY	%	90	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	%	10	GJ



USAGE PIE CHART AND %

HEATING	50	%
COOLING		%
VENTILATION		%
LIGHTING }	8	%
MOTORS/PUMPS }		%
LOSSES	42	%
MISC		%
		%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING Teacherage Duplex (#2)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	14	2	2	162								
SAVINGS PER UNIT $/Y	31	50	130	3.45								
TOTAL ENERGY SAVINGS $/Y	(434)[1]	100	260	558								
COMBINED ENERGY SAVINGS $/Y	1352											
UNIT RETROFIT COST $	9.20	139	254	17.30								
TOTAL RETROFIT COST $	(128)	278	508	2802								
COMBINED RETROFIT COST $	3716											
UNIT FUEL SAVING, L	75	123	290	8.4								
TOTAL FUEL SAVING, L	(1050)	246	580	1360								
COMBINED FUEL SAVINGS, L	3236	24										
UNIT ELECTRIC SAVING,KW			90									
TOTAL ELECTRIC SAVING,KW			180									
COMBINED ELECTRIC SAVING,KW	180											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	125											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	905											
PAYBACK PERIOD YRS	< 1.0	2.7	2	5								

1 Presently being Used

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
231 GJ	100%		106 GJ
	TOTAL		
Oil 90% 210			Oil 81% 86
Power 10% 21		SAVINGS 125 GJ/YEAR 54 %	Power 19% 20

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 231 CALC GJ
SUGGESTED ECM2 SAVINGS 125 GJ
FUTURE ANNUAL ENERGY TARGET 106+ GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 24,000 MJ = 3236 litres
GAS = MJ = m3
ELEC = 648 MJ = 180 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherages
Two singles
LOCATION Black Lake

Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Institutional
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 2
AGE OF BUILDING NA
LAST MAJOR RENOVATION DATES

SIZE 80 **m2**
BEPI (ACTUAL) 1656 EST
BEPI (TARGET) 1118

BUILDING CONTACT PERSON:
NAME Dave Maynard
TITLE Act. Principal
PHONE 284-2166
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 4
DESCRIBE Two identical units
photo's of front & back rear of each.

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

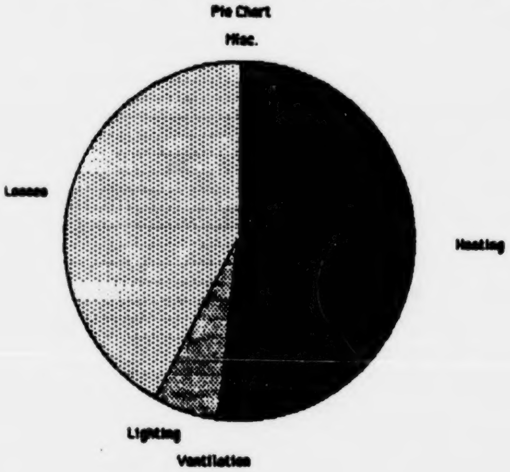
DESCRIPTION Single story wood frame structure, Gable roof, Basement and oil fired forced air heating. Retrofit recommendations, window vinyl film, set back thermostats, weather stripping (doors) & insulated basements. Note there are two single bldgs.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN	PRO RATED		**ENERGY OUT**	
FUELS	122 GJ	244	**E.F.F. LOSSES**	80 GJ
ELEC	10.5	21	**HEATING**	98
SOLAR GAIN			**COOLING**	
			LIGHTING	10.5
			MOTORS	
TOTALS	1325 GJ/Unit			
			TOTAL OUT	188.5 GJ

TOTAL ENERGY CONSUMED	100%	132.5	GJ
WEATHER SENSITIVE PORTION OF ENERGY	%	122.0	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	%	10.5	GJ



USAGE PIE CHART AND %

HEATING 52 %

COOLING %

VENTILATION %

LIGHTING 6 %

MOTORS/PUMPS %

LOSSES 42 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING Teacherages (two singles) per unit reported below

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	B'smt Ins. OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	3.6	1	1 (1)		44 (2)							
SAVINGS PER UNIT $/Y	31				4							
TOTAL ENERGY SAVINGS $/Y	111	50	130		176							
COMBINED ENERGY SAVINGS $/Y	467											
UNIT RETROFIT COST $	9.20				30							
TOTAL RETROFIT COST $	33	139	254		1320							
COMBINED RETROFIT COST $	1746											
UNIT FUEL SAVING, L	75				9.91							
TOTAL FUEL SAVING, L	270	123	290		436							
COMBINED FUEL SAVINGS, L	1119											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW			90									
COMBINED ELECTRIC SAVING,KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	43											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	537											
PAYBACK PERIOD YRS	< 1.0	2.7	2		7							

(1) 3°C (2) top 1.2 m

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

132.5 GJ 100%

TOTAL

SAVINGS

43 GJ/YEAR

32 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 132.5 GJ
SUGGESTED ECM2 SAVINGS 43 GJ
FUTURE ANNUAL ENERGY TARGET 89.5 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 43,000 MJ = 1119 litres
GAS = MJ = m3
ELEC = 324 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherage 4plex

LOCATION Black Lake

Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Institutional
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 8
AGE OF BUILDING 18 (1967)
LAST MAJOR RENOVATION DATES -

SIZE 257 **m2**

BEPI (ACTUAL) 2136
BEPI (TARGET) 1151

BUILDING CONTACT PERSON:
NAME Dave Maynard
TITLE Act. Principal
PHONE 284-2166
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 4
DESCRIBE- Two front & 2 back

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Wood frame & sided. Gable roof. Conc. basement. oil fired hot air furnaces & HWH's. Retrofit Rec. Window vinyl film. weather stripping (doors). set back stats,ceiling insulation & basement wall insulation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 387 low GJ Est

ELEC 43

SOLAR GAIN ______

Propane NA

______ ______

______ ______

TOTALS 430 GJ

ENERGY OUT

E.F.F. LOSSES 202 GJ

HEATING 304

COOLING ______

LIGHTING } 43

MOTORS }

______

______

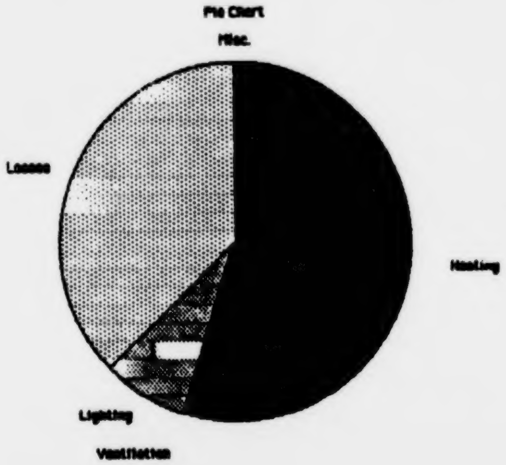
______

TOTAL OUT 549 GJ

TOTAL ENERGY CONSUMED 100% NA GJ

WEATHER SENSITIVE PORTION OF ENERGY % ______ GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % ______ GJ



USAGE PIE CHART AND %

HEATING 55 %

COOLING ______ %

VENTILATION ______ %

LIGHTING } %

MOTORS/PUMPS } 8 %

LOSSES 37 %

MISC ______ %

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING Teacherage 4 Plex

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	B'smt Ins. OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	16.5	8	4 (1)	257	103							
SAVINGS PER UNIT $/Y	31	50	130	3.45	4.00							
TOTAL ENERGY SAVINGS $/Y	511	400	520	886	412							
COMBINED ENERGY SAVINGS $/Y	2729											
UNIT RETROFIT COST $	9.20	139	254	17.30	30 (2)							
TOTAL RETROFIT COST $	151	1112	980	4446	3090							
COMBINED RETROFIT COST $	9779											
UNIT FUEL SAVING, L	75	123	290	8.4	9.91							
TOTAL FUEL SAVING, L	1237	984	1160	2158	1020							
COMBINED FUEL SAVINGS, L	6559											
UNIT ELECTRIC SAVING, KW			90									
TOTAL ELECTRIC SAVING, KW			360									
COMBINED ELECTRIC SAVING, KW	360											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	253											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	984											
PAYBACK PERIOD YRS	< 1.0	2.7	2	5	7							

(1) 3°C for 6 hours. (2) unfinished top 1.2 m

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

549 GJ Est. 100%

TOTAL

BEFORE	SAVINGS	AFTER
Oil 92% 506		Oil 85% 254
Power 8% 43	253 GJ/YEAR 46 %	Power 15% 42

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 549 GJ
SUGGESTED ECM2 SAVINGS 253 GJ
FUTURE ANNUAL ENERGY TARGET 296 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 252,000 MJ = 6559 litres
GAS = MJ = m3
ELEC = 1300 MJ = 360 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING School

LOCATION Black Lake

Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 226
AGE OF BUILDING 18
LAST MAJOR RENOVATION DATES 1970

SIZE 1195 **m2**

BEPI (ACTUAL) 4845
BEPI (TARGET) 2995

BUILDING CONTACT PERSON:
NAME Dave Maynard
TITLE Principal
PHONE 284-2166
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 4
DESCRIBE· Front, Back, & Ends

ENERGY AUDIT SURVEY DATA

DATE Jan. 26, 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC - ENERSAVE
TEAM LEADER POLLOCK

DESCRIPTION Following page.

Description of Black Lake School

The Building consists of three stages of construction starting with a two storey central core (537 m^2 1967) followed by single storey addition abutting the north end (358 m^2 1970) followed by addition of two portables (209 m^2).

The first addition is two level frame structure with half buried concrete strapped and insulated basement lower floor (R-12), the second expansion is single floor with half wall height made of concrete (strapped and insulated) and the other half wood frame structure, lower floor in both cases is concrete slab on grade. The portables (209 m^2) are also single story wood frame structures with a crawl space.

Phase 1 and 2 heating with hot water and wall fin radiation and the third by two oil fired hot air furnaces (one per unit). The radiation is zoned controlled in each room with thermostats.

Ventilation is provided with central unit duct to various rooms with a ducted return air supply. The unit is equipped with a mixed outside air controller with minimum position. Ventilation system is manually operated from boiler room.

Return air is from two zones by two exhaust fans. The one zone (from the gym) allows exhausting through gym return air from zone 1 if gym return air fan is off.

Exhaust fans are provided in 5 washrooms and also gym.

Two washroom exhaust fans are operating but not interconnected to duct work in the respective fan boxes, hence were just recirculating air within the box.

First floor in the two story section has subdivided classrooms without zone control. This results in some overheated classrooms during the winter.

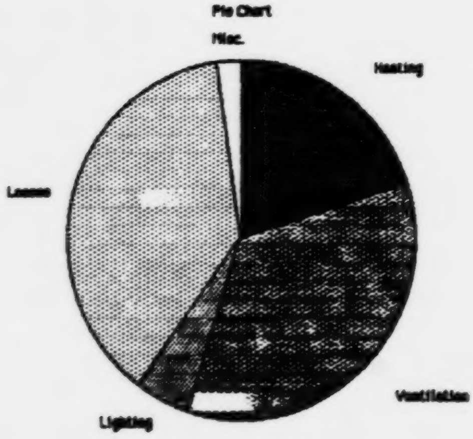
The building entry for this area acts as an air chute allowing cold drafts to the lower floor. The energy conservation items identified for possible application, are shown on the following retrofit option table.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	5525 GJ	E.F.F. LOSSES	2110 GJ
ELEC	264	HEATING	1071
SOLAR GAIN		COOLING	
		LIGHTING	264
		MOTORS	
		Vent & INF	1988
TOTALS	5789 GJ	HWH	107
		TOTAL OUT	5540 GJ

TOTAL ENERGY CONSUMED	100%	5789	GJ
WEATHER SENSITIVE PORTION OF ENERGY	92%	5346	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	8%	442	GJ



USAGE PIE CHART AND %

HEATING	20 %
COOLING	%
VENTILATION	35 %
LIGHTING	5 %
MOTORS/PUMPS	%
LOSSES	38 %
MISC	2 %
	%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING School

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	2-Vest #9 OTHERS	Option#14 MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING ~~FURNACES~~ Boilers	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS		4	12		2	1		5	123			
SAVINGS PER UNIT $/Y		50	258 (2)		286				3.92			
TOTAL ENERGY SAVINGS $/Y		200	3096		572	17,000 (2)		8232 (2)	874			
COMBINED ENERGY SAVINGS $/Y	29,974											
UNIT RETROFIT COST $		139	254		1770			6964	6.59			
TOTAL RETROFIT COST $		556	3048		3540	3850 (1)		27,800	1470			
COMBINED RETROFIT COST $	40,264											
UNIT FUEL SAVING, L		123	636		726							
TOTAL FUEL SAVING, L		492	7632		1452	26,000		20,000				
COMBINED FUEL SAVINGS, L	55,526											
UNIT ELECTRIC SAVING,KW									10			
TOTAL ELECTRIC SAVING,KW						16,800			2230			
COMBINED ELECTRIC SAVING,KW	19,030											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	2207											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1846											
PAYBACK PERIOD YRS		2.7	1.0		5.9	< 1.0		5	1.7			

(1) including 2000 transportation & sustenance costs
(2) based on actual system

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 **AFTER**

5789 GJ 100%

TOTAL

BEFORE		AFTER
Oil 95% 5525		Oil 95% 3386
Power 5% 264	SAVINGS 2207 GJ/YEAR 38 %	Power 5% 196

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 5789 GJ
SUGGESTED ECM2 SAVINGS 2207 GJ
FUTURE ANNUAL ENERGY TARGET 3582 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	213,000	MJ =	55,576	litres
GAS =		MJ =		m3
ELEC =	68,000	MJ =	1 9,030	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING H & W Clinic

LOCATION Black Lake

Fed Dept H & W Canada
EMR FILE #

BUILDING PRIMARY USE Clinic

CLASSIFICATION Institution
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 3
AGE OF BUILDING 7
LAST MAJOR RENOVATION DATES -

SIZE 185 **m2**

BEPI (ACTUAL) 4372
BEPI (TARGET) 4037

BUILDING CONTACT PERSON:
NAME Marion Ben
TITLE Nurse
PHONE 633-2167
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE Aug. 8/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Sask. Power Enersave
TEAM LEADER Pollock

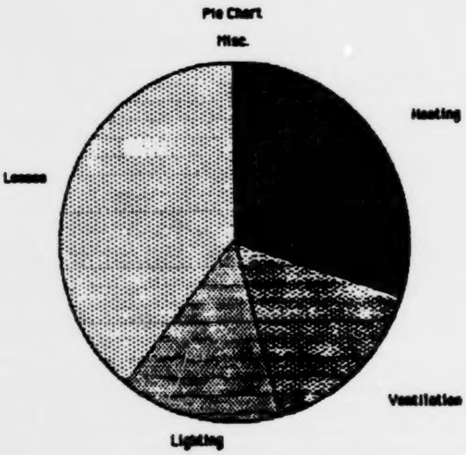
DESCRIPTION Two buildings interconnected, one gable roof portable office clinic & second Atco portable wood frame with crawl space, oil Hot air furnaces, new clinic proposed therefore short term measures recommended, ie. weather strip door, vinyl window film, temp. set back stat (3 degrees) & Sub Inc. lamps with Fl.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN			ENERGY OUT		
FUELS	692	GJ	**E.F.F. LOSSES**	310	GJ
ELEC	117		**HEATING**	245	
SOLAR GAIN			**COOLING**		
			LIGHTING	117	
			MOTORS		
			Vent&INF.	134	
TOTALS	809	GJ			
			TOTAL OUT	806	GJ

TOTAL ENERGY CONSUMED	100%	809	GJ
WEATHER SENSITIVE PORTION OF ENERGY	85 %	692	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	15 %	117	GJ



USAGE PIE CHART AND %

HEATING 30 %

COOLING %

VENTILATION 16 %

LIGHTING 15 %

MOTORS/PUMPS %

LOSSES 39 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING H & W Clinic

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	Option #18 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	13	1	1 (1)							15		
SAVINGS PER UNIT $/Y	31									40		
TOTAL ENERGY SAVINGS $/Y	403	50	200							600		
COMBINED ENERGY SAVINGS $/Y	1253											
UNIT RETROFIT COST $	9.2									42		
TOTAL RETROFIT COST $	120	139	254							630		
COMBINED RETROFIT COST $	1143											
UNIT FUEL SAVING, L	75											
TOTAL FUEL SAVING, L	975	123	373									
COMBINED FUEL SAVINGS, L	1471											
UNIT ELECTRIC SAVING, KW										102		
TOTAL ELECTRIC SAVING, KW			123							1530		
COMBINED ELECTRIC SAVING, KW	1653											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	62											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	335											
PAYBACK PERIOD YRS	< 1.0	2.7								1		

(1) 3°

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

809 GJ 100%

TOTAL

BEFORE	AFTER
Oil 692	Oil 636
Power 117	Power 111

SAVINGS

62 GJ/YEAR

8 %

% + GJ OF EACH ENERGY TYPE

1994 ANNUAL ENERGY CONSUMPTION 809 GJ
SUGGESTED ECM2 SAVINGS 62 GJ
FUTURE ANNUAL ENERGY TARGET 747 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	56,000	MJ =	1471	litres
GAS =		MJ =		m3
ELEC =	5,950	MJ =	1653	KWH
OTHERS		MJ =		
		MJ =		

5. . BUILDING SURVEY REPORT

BUILDING Band Office

LOCATION Black Lake

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 6

AGE OF BUILDING 15

LAST MAJOR RENOVATION DATES

SIZE 15 **m2**

BEPI (ACTUAL) 4687 MJ/m2

BEPI (TARGET) 3573 MJ/m2

BUILDING CONTACT PERSON:

NAME Ed Splett

TITLE Band Admin.

PHONE

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 1

DESCRIBE· Front

ENERGY AUDIT SURVEY DATA

DATE Aug. 8

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave

TEAM LEADER Pollock

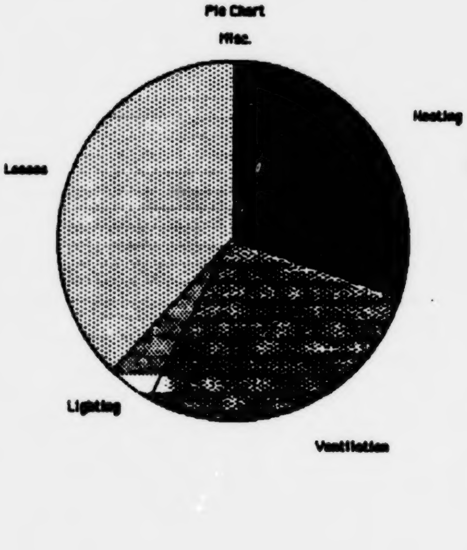
DESCRIPTION Wood frame, wood sided, gable roof, crawl space. Oilfired Hot air Furnace. Recommended vinyl seal window film, temp. set back, door weather stripping, econo f. lamps & attic insulation, set up oil burner. Bldg apparently to be converted to residences in near future at which time a vestibual could be considered.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN			ENERGY OUT		
FUELS	518	GJ	E.F.F. LOSSES	211	GJ
ELEC	21		HEATING	161	
SOLAR GAIN			COOLING		
			LIGHTING	21	
			MOTORS		
			Vent & Inf	156	
TOTALS	539	GJ			
			TOTAL OUT	549	GJ

TOTAL ENERGY CONSUMED	100%	539	GJ
WEATHER SENSITIVE PORTION OF ENERGY	96 %	518	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	4 %	21	GJ



USAGE PIE CHART AND %

HEATING	30	%
COOLING		%
VENTILATION & INF	28	%
LIGHTING	4	%
MOTORS/PUMPS		%
LOSSES	38	%
MISC		%
		%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING Band Office

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Set Up Oil Bur OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO- FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	10.3	1	1	115	1*				26			
SAVINGS PER UNIT $/Y	31			3.45					3.92			
TOTAL ENERGY SAVINGS $/Y	319	50	400	396	277				101			
COMBINED ENERGY SAVINGS $/Y	1543											
UNIT RETROFIT COST $	9.20			17.30					6.59			
TOTAL RETROFIT COST $	95	140	254	1989	500				171			
COMBINED RETROFIT COST $	3149											
UNIT FUEL SAVING, L	75			8.40								
TOTAL FUEL SAVING, L	772	123	747	966	684							
COMBINED FUEL SAVINGS, L	3292											
UNIT ELECTRIC SAVING,KW									10			
TOTAL ELECTRIC SAVING,KW			247						260			
COMBINED ELECTRIC SAVING,KW	507											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	128											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1111											
PAYBACK PERIOD YRS	< 1.0	2.7	< 1.0	5	2				1.7			

* 5%, separate trip

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
539 GJ 100%		411 GJ
TOTAL		
Oil 96% 518		Oil 95% 392
Power 4% 21	SAVINGS 128 GJ/YEAR 24 %	Power 5% 19

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 539 GJ
SUGGESTED ECM2 SAVINGS 128 GJ
FUTURE ANNUAL ENERGY TARGET 411 GJ

ACTUAL BEPI = MJ/m²
TARGET BEPI = MJ/m²

FUEL TYPE SAVINGS

OIL = 126,000 MJ = 3292 litres
GAS = MJ = m3
ELEC = 1,800 MJ = 507 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Sask Tel

LOCATION Black Lake

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Equipment Bldg (CDO)

CLASSIFICATION 111
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 1
AGE OF BUILDING NA
LAST MAJOR RENOVATION DATES

SIZE 18 **m2**

BEPI (ACTUAL) 2600
BEPI (TARGET) 2161

BUILDING CONTACT PERSON:
NAME E. Splett P.Eng
TITLE Section Manager
PHONE Sask Tel 347-2066
PHOTOGRAPHS AVAILABLE YES ___ **NO** X
NUMBER
DESCRIBE

ENERGY AUDIT SURVEY DATA

DATE 8|8|84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Pollock

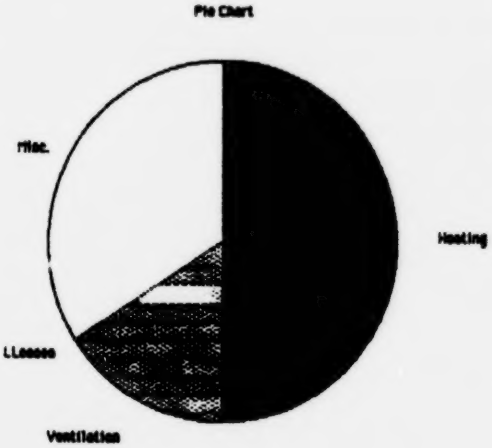
DESCRIPTION Atco portable, typical Sask Tel CDO building. High reliability no maintence Ac & heating required. Being electrically heated & A/C should be insulated to R30+. Retrofit recommendation, exterior insulation, storm door.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	GJ	E.F.F. LOSSES	GJ
ELEC	46.8	HEATING	23
SOLAR GAIN		COOLING	7.3
		LIGHTING	
		MOTORS	
		EQUIP	15.7
TOTALS	46.8 GJ		
		TOTAL OUT	46 GJ

TOTAL ENERGY CONSUMED	100%	46.8	GJ
WEATHER SENSITIVE PORTION OF ENERGY	65 %	30.3	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	35 %	16.5	GJ



USAGE PIE CHART AND %

HEATING 50 %
COOLING 16 %
VENTILATION %
LIGHTING %
MOTORS/PUMPS %
LOSSES %
MISC 34 %
%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING Sask -Tel GDO Building

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	R30+ Ext. Ins OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Exterior S. Door OTHERS	OTHERS
NUMBER OF UNITS					100						1	
SAVINGS PER UNIT $/Y					7.31 (1)							
TOTAL ENERGY SAVINGS $/Y					731						126	
COMBINED ENERGY SAVINGS $/Y	857											
UNIT RETROFIT COST $					64							
TOTAL RETROFIT COST $					6400						550	
COMBINED RETROFIT COST $	6950											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L												
COMBINED FUEL SAVINGS, L												
UNIT ELECTRIC SAVING, KW					18.7							
TOTAL ELECTRIC SAVING, KW					1870						323	
COMBINED ELECTRIC SAVING, KW	2193											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	7.9											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	438											
PAYBACK PERIOD YRS					8						4.3	

(1) 6.91 heating + 0.40 a/c

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
46.8 GJ	100%		38.9 GJ
	TOTAL		

SAVINGS

7.9 GJ/YEAR

17 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 46.8 GJ
SUGGESTED ECM2 SAVINGS 7.9 GJ
FUTURE ANNUAL ENERGY TARGET 38.9 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL =		MJ =		litres
GAS =		MJ =		m3
ELEC =	78,948	MJ =	2193	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Band Hall

LOCATION Black Lake

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Assembly

CLASSIFICATION Institution

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 70

AGE OF BUILDING 4

LAST MAJOR RENOVATION DATES

SIZE 209 **m2**

BEPI (ACTUAL) 3631

BEPI (TARGET) 2449

BUILDING CONTACT PERSON:

NAME Ed Splett

TITLE Band Admin.

PHONE

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 2

DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE Jan. 26, 1984

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave

TEAM LEADER Pollock

DESCRIPTION Single Story, frame structure & siding with joist roof & crawl space. Oil fired forced air heating. High boys with fan cabinet covers off. *Bldg fairly new, econo measures, cover high windows with vinyl film seal, refit door frames, provide crawl space vent covers as should be closed in winter. Use set-back stats & econo lamps, & outside air dampers.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 696 GJ

ELEC 63

SOLAR GAIN

TOTALS 759 GJ

ENERGY OUT

E.F.F. LOSSES 236 GJ

HEATING & INF. 460

COOLING

LIGHTING 63

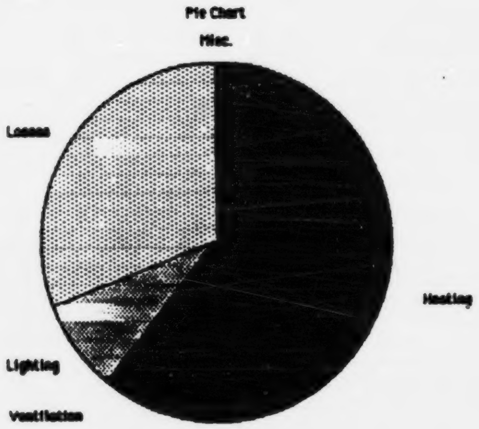
MOTORS

TOTAL OUT 759 GJ

TOTAL ENERGY CONSUMED 100% GJ

WEATHER SENSITIVE PORTION OF ENERGY % GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % GJ



USAGE PIE CHART AND %

HEATING 61 %

COOLING %

VENTILATION %

LIGHTING %

MOTORS/PUMPS 8 %

LOSSES 31 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Black Lake BUILDING Band Hall

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Crawl Space Vent OTHERS	MANUAL VENTILATION CONTROL	OP# 13 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	#12 Furnace Covers On OTHERS	OTHERS
NUMBER OF UNITS	1.7	4	3		4		3		113		3	
SAVINGS PER UNIT $/Y	31	50	400		50+		400 (1)		3.92		400	
TOTAL ENERGY SAVINGS $/Y	52	200	1200		200+		1200		442		1200	
COMBINED ENERGY SAVINGS $/Y	4494											
UNIT RETROFIT COST $	9.20	139	254		139		1520		6.59			
TOTAL RETROFIT COST $	15	556	762		556		4560		744			
COMBINED RETROFIT COST $	7193											
UNIT FUEL SAVING, L	75	123	747		123		977					
TOTAL FUEL SAVING, L	127	492	2241		492		2931				2930	
COMBINED FUEL SAVINGS, L	9213											
UNIT ELECTRIC SAVING,KW			247						10			
TOTAL ELECTRIC SAVING,KW			741						1130			
COMBINED ELECTRIC SAVING,KW	1871											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	360											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1722											
PAYBACK PERIOD YRS	∠1.0	2.8	1.6		2.8		3.8		1.7			

(1) 24 Kw Units

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

759 GJ 100%

TOTAL

BEFORE	SAVINGS	AFTER
Oil 92% 696		Oil 85% 342
Power 8% 63	360 GJ/YEAR 47 %	Power 15% 57

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 759 GJ
SUGGESTED ECM2 SAVINGS 360 GJ
FUTURE ANNUAL ENERGY TARGET 399 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL =	354,000	MJ =	9213	litres
GAS =		MJ =		m^3
ELEC =	6,000	MJ =	1871	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Northern Hamlet Office
Former DNS office/W'hse
LOCATION Brabant Lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Office/W'hse

CLASSIFICATION Institution
OCCUPANCY TYPE C (part-time)
OCCUPANCY AVERAGE 1
AGE OF BUILDING 15
LAST MAJOR RENOVATION DATES 1984

SIZE 109 **m2**
BEPI (ACTUAL)
BEPI (TARGET)

BUILDING CONTACT PERSON:
NAME W.B. Pennefather
TITLE Council Member
PHONE 758-4916
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 2
DESCRIBE- Front & Back

ENERGY AUDIT SURVEY DATA

DATE Aug 7/1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Pollock

DESCRIPTION Wood frame, wood sided, gable roof, crawl space.Bldg part used for W'Hse,oil heating, conservation items suggested; econo lamps temp set back stat, vinyl window seal & additional attic insulation. No energy consumption records. Note, building under renovation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS ______________ GJ

ELEC ______________

SOLAR GAIN __________

____ ______________

____ ______________

____ ______________

TOTALS ______________ GJ

ENERGY OUT

E.F.F. LOSSES ________________ GJ

HEATING ________________________

COOLING ________________________

LIGHTING _______________________

MOTORS _________________________

____

____

____

TOTAL OUT 163 GJ Estimate
Based on BEPI = 1500

TOTAL ENERGY CONSUMED 100% ______________ GJ
WEATHER SENSITIVE PORTION OF ENERGY % ______________ GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY % ______________ GJ

USAGE PIE CHART AND %

HEATING ____________________ %

COOLING ____________________ %

VENTILATION ________________ %

LIGHTING ___________________ %

MOTORS/PUMPS _______________ %

LOSSES _____________________ %

MISC _______________________ %

____________________ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Brabant Lake BUILDING Northern Hamlet Office

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	Option #18 ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	2	2 (1)	1 (2)	109 (1)					6			
SAVINGS PER UNIT $/Y	31	50		3.45					40 (4)			
TOTAL ENERGY SAVINGS $/Y	62	100	130	(376) (3)					240			
COMBINED ENERGY SAVINGS $/Y	532											
UNIT RETROFIT COST $	9.20	139		17.30					42			
TOTAL RETROFIT COST $	18.40	278	254	(1885) (3)					252			
COMBINED RETROFIT COST $	802											
UNIT FUEL SAVING, L	75	123		8.40								
TOTAL FUEL SAVING, L	150	246	290	(915) (3)								
COMBINED FUEL SAVINGS, L	686											
UNIT ELECTRIC SAVING, KW									102			
TOTAL ELECTRIC SAVING, KW			90						612			
COMBINED ELECTRIC SAVING, KW	702											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	28.5											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	261											
PAYBACK PERIOD YRS	< 1	3	2						1			

(1) may have been completed in renovation
(2) assume 40 hr occupancy per week
(3) Not in totals
(4) $0.39/KW

5. BUILDING SURVEY REPORT

BUILDING Brabant Lake (Northern Lights School Division)

LOCATION Brabant
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 100
AGE OF BUILDING 7
LAST MAJOR RENOVATION DATES

SIZE 770 **m2**
BEPI (ACTUAL) 1429
BEPI (TARGET) 1304

BUILDING CONTACT PERSON:
NAME W.B. Pennefather
TITLE Principal
PHONE 758-4916
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE· Front & Side views

ENERGY AUDIT SURVEY DATA

DATE Aug. 7/1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Mcarton

DESCRIPTION Wood frame bldg, wood joist ceiling, stucco & wood siding, crawl space, combination wood/oil forced air heating some Hw fan coils. Fairly new condition; conservation measures identified, more efficient lighting, outside air control, Ent. heating Mod, improved door W.S. & crawl space heating by hot water in lui of elec.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 771 GJ

ELEC 330

SOLAR GAIN

TOTALS 1101 GJ

ENERGY OUT

E.F.F. LOSSES 221 GJ

HEATING 348

COOLING

LIGHTING } 330

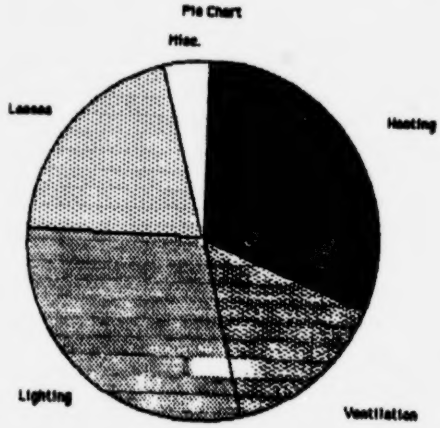
MOTORS }

Vent& Misc. 168

HWH 47

TOTAL OUT 1114 GJ

TOTAL ENERGY CONSUMED	100%	1101	GJ
WEATHER SENSITIVE PORTION OF ENERGY	%	724	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	%	377	GJ



USAGE PIE CHART AND %

HEATING 31 %

COOLING %

VENTILATION 15 %

LIGHTING } 30 %

MOTORS/PUMPS } %

LOSSES 20 %

MISC 4 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Brabant Lake BUILDING School

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Sub Outdoor INC with HPS OTHERS	MANUAL VENTILATION CONTROL	OP #13 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OP #11 Modify Entry Heating OTHERS	OP#22 Sub Outdoor MV with HPS Lamps OTHERS
NUMBER OF UNITS		2	(2)		4		3		286	4	1	10
SAVINGS PER UNIT $/Y		50			84		502		3.92	40		(286) (1)
TOTAL ENERGY SAVINGS $/Y		100			336		1506		1121	160	973	1430
COMBINED ENERGY SAVINGS $/Y	5626(3)											
UNIT RETROFIT COST $		139			261		1520		6.59	42		261
TOTAL RETROFIT COST $		278			1044		4560		1884	168	1250	2610
COMBINED RETROFIT COST $	11,794											
UNIT FUEL SAVING, L		123					1121					
TOTAL FUEL SAVING, L		246					3663				-2366	
COMBINED FUEL SAVINGS, L	1543											
UNIT ELECTRIC SAVING, KW					215				10	102		365 (1)
TOTAL ELECTRIC SAVING, KW					860				2860	408	2482	3650
COMBINED ELECTRIC SAVING, KW	10,260											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	96.3											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	125											
PAYBACK PERIOD YRS (3)		2.7			2.5		3		1.7	1	1.3	2

(1) 50% of present fixtures broken and need replacement
(2) reportedly being practiced
(3) based on $1.85/gal fuel prices

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
1101 GJ	100%		1005 GJ
	TOTAL		
	Oil 70% 771		Oil 70% 712
	Power 30% 330	SAVINGS 96.3 GJ/YEAR 9 %	Power 30% 293

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1101 GJ
SUGGESTED ECM2 SAVINGS 96 GJ
FUTURE ANNUAL ENERGY TARGET 1005 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 59,400 MJ = 1543 litres
GAS = MJ = m3
ELEC = 36,900 MJ = 10,260 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherage (Northern Lights School Division) (Duplex)
LOCATION Brabant Lake

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residential

CLASSIFICATION 24
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 2
AGE OF BUILDING 7
LAST MAJOR RENOVATION DATES

SIZE 197 **m2**
BEPI (ACTUAL) 1426
BEPI (TARGET) 781

BUILDING CONTACT PERSON:
NAME W.B. Pennefather
TITLE Principal
PHONE 758-4811
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 3
DESCRIBE· Front, Back & sides

ENERGY AUDIT SURVEY DATA

DATE 20/03/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Wood frame, & sided gable roof on grade bldg with oil fired hot air furnaces. Recommended weather stripping, temp. set back, vinyl window seal & additional attic insulation, & consideration of gas fired water heater in lui of electric (not shown in retrofit options.)

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS ____209____ GJ

ELEC ____72____

SOLAR GAIN ________

____ ________

____ ________

____ ________

TOTALS ____281____ GJ

ENERGY OUT

E.F.F. LOSSES ____84____ GJ

HEATING ____125____

COOLING ________

LIGHTING ____}72____

MOTORS ____}____

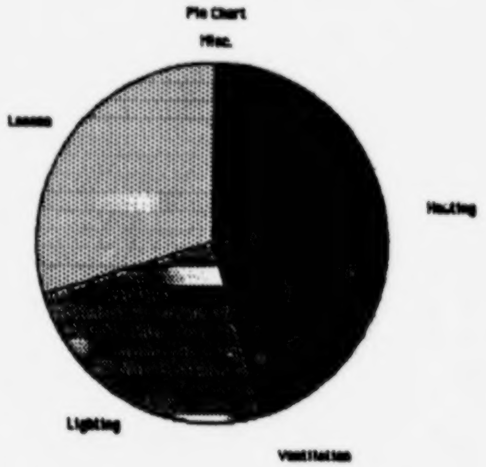
____

____

____

TOTAL OUT ____281____ GJ

TOTAL ENERGY CONSUMED	100%	281	GJ
WEATHER SENSITIVE PORTION OF ENERGY	74 %	209	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	26 %	72	GJ



USAGE PIE CHART AND %

HEATING ____45____ %

COOLING ________ %

VENTILATION ________ %

LIGHTING ____}25____ %

MOTORS/PUMPS ____}____ %

LOSSES ____30____ %

MISC ________ %

________ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Brabant Lake BUILDING Teacherage Duplex

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	Night TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	11	2	2	197								
SAVINGS PER UNIT $/Y	31	50	150	3.45								
TOTAL ENERGY SAVINGS $/Y	341	100	260	679								
COMBINED ENERGY SAVINGS $/Y	1380											
UNIT RETROFIT COST $	9.20	139	254	17.30								
TOTAL RETROFIT COST $	101.20	278	508	3408								
COMBINED RETROFIT COST $	4895											
UNIT FUEL SAVING, L	75	123	290	8.40								
TOTAL FUEL SAVING, L	825	246	580	1654								
COMBINED FUEL SAVINGS, L	3305											
UNIT ELECTRIC SAVING, KW			90									
TOTAL ELECTRIC SAVING, KW			180									
COMBINED ELECTRIC SAVING, KW	180											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	127											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	647											
PAYBACK PERIOD YRS	< 1.0	2.7		5.0								

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
281 GJ	100%		154 GJ
	TOTAL		
Oil 75% 209			Oil 54% 83
Power 25% 72		SAVINGS 127 GJ/YEAR 45 %	Power 71

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 281 GJ
SUGGESTED ECM2 SAVINGS 127 GJ
FUTURE ANNUAL ENERGY TARGET 154 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL =	127,000	MJ =	3305	litres
GAS =		MJ =		m^3
ELEC =	600	MJ =	180	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Sask. Tel

LOCATION Brabant lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE

CLASSIFICATION Institution
OCCUPANCY TYPE
OCCUPANCY AVERAGE
AGE OF BUILDING
LAST MAJOR RENOVATION DATES

SIZE ____ **m2**
BEPI (ACTUAL) NA
BEPI (TARGET)

BUILDING CONTACT PERSON:
NAME E. Splett
TITLE Eng.
PHONE 347-2440
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 1
DESCRIBE Relay Station

ENERGY AUDIT SURVEY DATA

DATE
SURVEY TYPE # None

SURVEY BY: COMPANY NAME
TEAM LEADER

DESCRIPTION Most energy used by communication equipment, conventional conservation measures N.A.

5. BUILDING SURVEY REPORT

BUILDING Power Plant (Diesel)

LOCATION Camsell Portage Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Power Generation

CLASSIFICATION Institutional
OCCUPANCY TYPE none
OCCUPANCY AVERAGE -
AGE OF BUILDING 20 ?
LAST MAJOR RENOVATION DATES Periodically replaced with overhaul units
SIZE m2
BEPI (ACTUAL) NA
BEPI (TARGET)

BUILDING CONTACT PERSON:
NAME North-Sask ElectricLtd
TITLE W.C. Mclachlan -Manager
PHONE 425-2019
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE- Front & Rear

ENERGY AUDIT SURVEY DATA

DATE
SURVEY TYPE # None

SURVEY BY: COMPANY NAME
TEAM LEADER

DESCRIPTION 1-50 & 75 KVA skid Mtd trailer units, 10'X 15' insulated armco buildings with engine cooling fan discharged (air) interconnected with air plenum between trailers for winter heating. No surplus heat for recovery export. (100MBH(30Kw/h)cooling system heat) Generation at <20% efficiency. Electric fan clutch suggested.

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Camsell Portage BUILDING North Sask Electric Plan

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Electric Rad Fan Clutches OTHERS	OTHERS
NUMBER OF UNITS											2	
SAVINGS PER UNIT $/Y												
TOTAL ENERGY SAVINGS $/Y											3360	
COMBINED ENERGY SAVINGS $/Y	3360											
UNIT RETROFIT COST $											4500	
TOTAL RETPOFIT COST $											9000	
COMBINED RETROFIT COST $	9000											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L											8400	
COMBINED FUEL SAVINGS, L	8400											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW												
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	323											
COMBINED UNIT ENERGY SAVING, (MJ/M2)												
PAYBACK PERIOD YRS											2.7	

(1) 40¢/L

(2) $0.7 \times \frac{2\ \text{KW}}{50\text{x}.3} \times 90{,}000\ \text{L/y} \times \$0.40/\text{L} = \$3360/\text{y}$

(3) 30% LF Smallest Unit

5. BUILDING SURVEY REPORT

BUILDING School (Northern Lights School Division)

LOCATION Camsell Portage
Sask
Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 16
AGE OF BUILDING 25
LAST MAJOR RENOVATION DATES 1969

SIZE 191 **m2**
BEPI (ACTUAL) 3219
BEPI (TARGET) 2225

BUILDING CONTACT PERSON:
NAME Jim Churchward
TITLE Principal
PHONE 498-2955
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE Front & back.

ENERGY AUDIT SURVEY DATA

DATE 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Pollock

DESCRIPTION Wood frame, oil fired force air heating. Poorly insulated, under utilized blg.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 570 GJ

ELEC 48

SOLAR GAIN

TOTALS 618 GJ

ENERGY OUT

E.F.F. LOSSES 194 + GJ One bad furnace

HEATING 268

COOLING

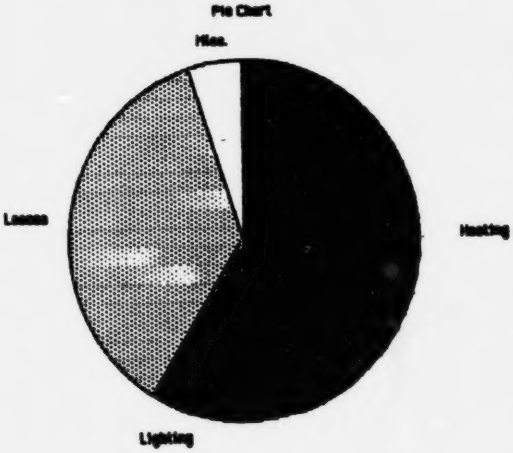
LIGHTING } 48

MOTORS }

HWH 24+

TOTAL OUT 534 GJ

TOTAL ENERGY CONSUMED	100%	618	GJ
WEATHER SENSITIVE PORTION OF ENERGY	86%	420	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	14%	86	GJ



USAGE PIE CHART AND %

HEATING 50 %

COOLING %

VENTILATION %

LIGHTING } 9 %

MOTORS/PUMPS } %

LOSSES 36 %

MISC 5 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Camsell Portage BUILDING School (Northern Lights School Division)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	10	2	2			2			32			
SAVINGS PER UNIT $/Y	31	50	400			502			3.92			
TOTAL ENERGY SAVINGS $/Y	310	100	800			1004			125			
COMBINED ENERGY SAVINGS $/Y	2339											
UNIT RETROFIT COST $	9.20	140	254			1520			6.59			
TOTAL RETROFIT COST $	92	280	508			3040			210			
COMBINED RETROFIT COST $	4130											
UNIT FUEL SAVING, L	75	123	747			1221						
TOTAL FUEL SAVING, L	750	246	1494			2442						
COMBINED FUEL SAVINGS, L	4932											
UNIT ELECTRIC SAVING, KW			247						10			
TOTAL ELECTRIC SAVING, KW			494						320			
COMBINED ELECTRIC SAVING, KW	814											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	193											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1010											
PAYBACK PERIOD YRS	< 1.0	2.7	< 1.0			3			1.7			

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
618 GJ	100%		425 GJ
	TOTAL		
Oil 92% 570			Oil 89% 380
Power 8% 48		SAVINGS 193 GJ/YEAR 31 %	Power 11% 45

% + GJ OF EACH ENERGY TYPE

1983-84 ANNUAL ENERGY CONSUMPTION 618 GJ

SUGGESTED ECM2 SAVINGS 193 GJ

FUTURE ANNUAL ENERGY TARGET 425 GJ

ACTUAL BEPI = MJ/m^2

TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 190,000 MJ = 4932 litres

GAS = MJ = m^3

ELEC = 2930 MJ = 814 KWH

OTHERS MJ =

MJ =

5. BUILDING SURVEY REPORT

BUILDING PRR
Residence Warehouse
LOCATION Camsell Portage
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Warehouse & Temp. Residence (Summer)

CLASSIFICATION Institutional 111
OCCUPANCY TYPE A (when occupied)
OCCUPANCY AVERAGE (2)
AGE OF BUILDING 15
LAST MAJOR RENOVATION DATES

SIZE 44 **m2**

BEPI (ACTUAL)
BEPI (TARGET)

BUILDING CONTACT PERSON:
NAME Bill Bunko
TITLE Regional Director
PHONE 445-6255
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 1
DESCRIBE · Front view

ENERGY AUDIT SURVEY DATA

DATE
SURVEY TYPE # None

SURVEY BY: COMPANY NAME
TEAM LEADER

DESCRIPTION Building could almost be labeled construction shack. Usually unheated in winter, only weather stripping & vinyl window kit recommended. However if siding is added insulation should be up graded as per Retrofit Option #1

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Camsell Portage BUILDING PRR Resid/w'house

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	2	1										
SAVINGS PER UNIT $/Y	31											
TOTAL ENERGY SAVINGS $/Y	62	50										
COMBINED ENERGY SAVINGS $/Y	112											
UNIT RETROFIT COST $	9.20											
TOTAL RETROFIT COST $	18.40	140										
COMBINED RETROFIT COST $	158											
UNIT FUEL SAVING, L	75											
TOTAL FUEL SAVING, L	150	123										
COMBINED FUEL SAVINGS, L	273											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW												
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	10											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	238											
PAYBACK PERIOD YRS *	<1.0	2.7										

* Based on full season occupancy

5. BUILDING SURVEY REPORT

BUILDING Teacherage

LOCATION CamsellPortage
Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Residential V
OCCUPANCY TYPE B
OCCUPANCY AVERAGE 1
AGE OF BUILDING 15+
LAST MAJOR RENOVATION DATES

SIZE 60 **m2**

BEPI (ACTUAL) 3700
BEPI (TARGET) 2660

BUILDING CONTACT PERSON:
NAME Jim Churchward
TITLE Principal
PHONE 498-2955
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE AUG 19/85

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Wood frame, gable roof, crawl space, hot air oil fired furnace, building in good condition, new oil burner or furnace should be considered. Retrofit indentified is vinyl window film, weather stripping, temp set back

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 174 GJ

ELEC 48

SOLAR GAIN ______

____ ______

____ ______

____ ______

TOTALS 222 GJ

ENERGY OUT

E.F.F. LOSSES 62+ GJ

HEATING 76

COOLING ______

LIGHTING 48

MOTORS ______

HWH 18

______

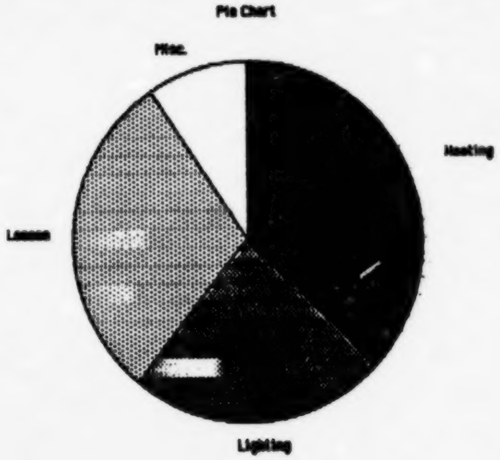
______

TOTAL OUT 204 GJ

TOTAL ENERGY CONSUMED 100% 222 GJ

WEATHER SENSITIVE PORTION OF ENERGY 68% 150 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY 32% 72 GJ



USAGE PIE CHART AND %

HEATING 37 %

COOLING ______ %

VENTILATION ______ %

LIGHTING 24 %

MOTORS/PUMPS ______ %

LOSSES 30 %

MISC ______ %

HWH 9

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Camsell Portage BUILDING Teacherage (Northern Lights School Division)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW * CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	7.6	2	1	60				1				
SAVINGS PER UNIT $/Y	31	50		3.45								
TOTAL ENERGY SAVINGS $/Y	235	100	130	207				(862)				
COMBINED ENERGY SAVINGS $/Y	672											
UNIT RETROFIT COST $	9.20	139		17.30								
TOTAL RETROFIT COST $	70	278	254	1038				(5890)				
COMBINED RETROFIT COST $	1640											
UNIT FUEL SAVING, L	75	123		8.4								
TOTAL FUEL SAVING, L	570	246	290	504				(2097)				
COMBINED FUEL SAVINGS, L	1610											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			90									
COMBINED ELECTRIC SAVING, KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	62											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1033											
PAYBACK PERIOD YRS	< 1.0	2.7	2	5				6.8				

*oil fired when available (30% improved eff.) not included in totals

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
222 GJ		106 GJ

100%

TOTAL

Oil 78% 174		Oil 70% 112
Power 21% 48	SAVINGS	Power 30% 48

62 GJ/YEAR

28 %

% + GJ OF EACH ENERGY TYPE

19__ ANNUAL ENERGY CONSUMPTION 222 GJ
SUGGESTED ECM2 SAVINGS 62 GJ
FUTURE ANNUAL ENERGY TARGET 160 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	62,000	MJ =	1610	litres
GAS =		MJ =		m3
ELEC =	300	MJ =	90	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING School
Northern Lights School Division
LOCATION Deschambault Lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 194
AGE OF BUILDING 1981
LAST MAJOR RENOVATION DATES

SIZE 2234 **m2**
BEPI (ACTUAL) 1321 MJm
BEPI (TARGET) 1091

BUILDING CONTACT PERSON:
NAME Ken Loewen
TITLE Principal
PHONE 632-4446
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER
DESCRIBE 4 exterior views

ENERGY AUDIT SURVEY DATA

DATE Aug 8, 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Pollock.

DESCRIPTION Single story, masonry Bldg (double wye). Part B'M nt 116m2 part crawl space 340 m2, balance slab on grade 1778 m2, flat built up roof system. Steel joist suspended ceiling 72% GLU-LAM & deck 28%. Double glazed windows H &V system combination wall fin, fan coil & unit heaters, vent by roof mt'd mixed air units with 10% min. O.A. stops. Time clock controlled

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 1991 GJ

ELEC 961

SOLAR GAIN

TOTALS 2952 GJ

ENERGY OUT

E.F.F. LOSSES 518 GJ

HEATING 602

COOLING

LIGHTING 961

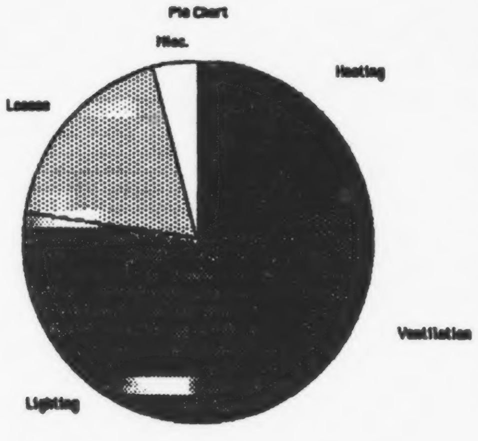
MOTORS

Ventilation 607

HWH 92

TOTAL OUT 2780 GJ

TOTAL ENERGY CONSUMED	100%	2952	GJ
WEATHER SENSITIVE PORTION OF ENERGY	65 %	1899	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	35 %	1052	GJ



USAGE PIE CHART AND %

HEATING 21 %

COOLING %

VENTILATION 22 %

LIGHTING 35 %

MOTORS/PUMPS %

LOSSES 18 %

MISC 4 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault BUILDING School (Northern Lights School Division)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	(3) OTHERS	(4) OTHERS
NUMBER OF UNITS			18				4		780		64	15
SAVINGS PER UNIT $/Y			200 (1)				911		3.92		15.60	160
TOTAL ENERGY SAVINGS $/Y			3600				3644		3057		998	2400
COMBINED ENERGY SAVINGS $/Y	13,699											
UNIT RETROFIT COST $			361 (2)				1850		6.59		10.64	114
TOTAL RETROFIT COST $			6498				7400		5140		680	1710
COMBINED RETROFIT COST $	21,428											
UNIT FUEL SAVING, L			373				1221					
TOTAL FUEL SAVING, L			6714				4884					
COMBINED FUEL SAVINGS, L	11,589											
UNIT ELECTRIC SAVING, KW			124						10		40	411
TOTAL ELECTRIC SAVING, KW			2232						7800		2560	6165
COMBINED ELECTRIC SAVING, KW	18,757											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	513											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	230											
PAYBACK PERIOD YRS			1.8				2		1.7		.7	.7

(1) 15 KW heating capacity each (2) pnematic stats and base controllers
(3) 120 watt econo R lamp in Lui of R40 Lamp
(4) HPS lamp replace 400 W MV

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
2952 GJ	100%		2439 GJ
	TOTAL		
Oil 67% 1991			Oil 63% 1545
Power 33% 961		SAVINGS 513 GJ/YEAR 17 %	Power 37% 894

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 2952 GJ
SUGGESTED ECM2 SAVINGS 513 GJ
FUTURE ANNUAL ENERGY TARGET 2439 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	446,000	MJ =	11,598	litres
GAS =		MJ =		m3
ELEC =	67,000	MJ =	18,757	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Teacherage (Northern Lights School Division)
Trailer 2 & 3
LOCATION Deschambeault Lake.
Sask.
Fed Dept __________
EMR FILE # __________

BUILDING PRIMARY USE Residence

CLASSIFICATION Residential
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 2
AGE OF BUILDING N/A
LAST MAJOR RENOVATION DATES __________

SIZE 69 **m2**/Trailer
BEPI (ACTUAL) 2289
BEPI (TARGET) 1739

BUILDING CONTACT PERSON:
NAME Ken Loewen
TITLE Principal
PHONE 632-4446
PHOTOGRAPHS AVAILABLE YES X **NO** ____
NUMBER 2
DESCRIBE Front & Side views

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN.
TEAM LEADER __________

DESCRIPTION Mobile home, open crawl space, oil heating, has vestibual.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 106 GJ

ELEC 52

SOLAR GAIN

TOTALS 158 GJ

Pro-rated
Per Trailer
(316 for two units)

ENERGY OUT

E.F.F. LOSSES 47 GJ

HEATING 43

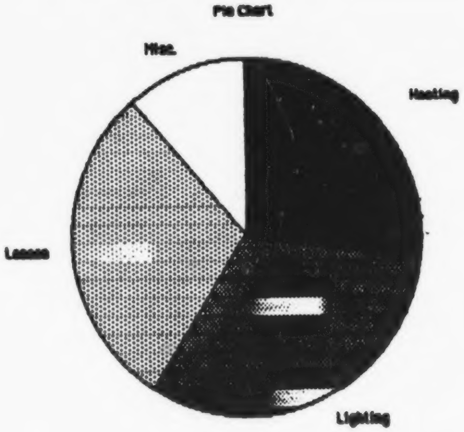
COOLING

LIGHTING } 52
MOTORS

HWH 18

TOTAL OUT 160 GJ

TOTAL ENERGY CONSUMED	100%	158	GJ
WEATHER SENSITIVE PORTION OF ENERGY	50%	78	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	50%	80	GJ



USAGE PIE CHART AND %

HEATING 27 %

COOLING %

VENTILATION %

LIGHTING } 32 %
MOTORS/PUMPS %

LOSSES 30 %

MISC 11 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault BUILDING Teacherage (Trailer) This table is per trailer.

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	6.3	2	1 (1)									
SAVINGS PER UNIT $/Y	31	50	130									
TOTAL ENERGY SAVINGS $/Y	195	100	130									
COMBINED ENERGY SAVINGS $/Y	425											
UNIT RETROFIT COST $	9.20	140	254									
TOTAL RETROFIT COST $	58	280	254									
COMBINED RETROFIT COST $	592											
UNIT FUEL SAVING, L	75	123										
TOTAL FUEL SAVING, L	472	246	290									
COMBINED FUEL SAVINGS, L	1008											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW	90		90									
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	38											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	555											
PAYBACK PERIOD YRS	< 1	1.4	2									

(1) $3^{0}C/6$ hours

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

158 GJ 100% 120 GJ

TOTAL

SAVINGS

38 GJ/YEAR

24 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 158 GJ
SUGGESTED ECM2 SAVINGS 38 GJ
FUTURE ANNUAL ENERGY TARGET 120 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 38,000 MJ = 1008 litres
GAS = MJ = m3
ELEC = 324 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherage (Triplex)
Northern Lights School Division
LOCATION Deschambault Lake
Sask
Fed Dept ________
EMR FILE # ________

BUILDING PRIMARY USE Residence

CLASSIFICATION Residential
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 6
AGE OF BUILDING Na
LAST MAJOR RENOVATION DATES ________

SIZE 355 **m2**
BEPI (ACTUAL) 1873
BEPI (TARGET) 1363

BUILDING CONTACT PERSON:
NAME Ken Loewen
TITLE Principal
PHONE 632-446
PHOTOGRAPHS AVAILABLE YES x **NO** ____
NUMBER 2
DESCRIBE · Front & Side

ENERGY AUDIT SURVEY DATA

DATE ________
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA
TEAM LEADER ________

DESCRIPTION Single story, wood frame & sided, gable roof Bldg with basement, vinyl slider windows, oil heating, relatively new. Retrofit suggested vinyl film, Temp. set back. Thermostats & touch up weather stripping.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 470 GJ

ELEC 195

SOLAR GAIN

TOTALS 665 GJ

ENERGY OUT

E.F.F. LOSSES 259 GJ

HEATING 388

COOLING

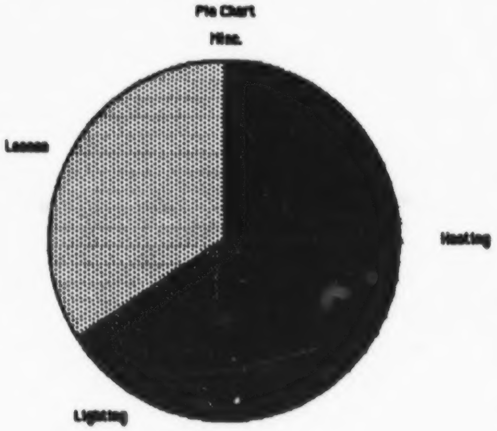
LIGHTING 55

MOTORS

HWH 55

TOTAL OUT 757 GJ

TOTAL ENERGY CONSUMED	100%	665	GJ
WEATHER SENSITIVE PORTION OF ENERGY	30%	195	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	70%	470	GJ



USAGE PIE CHART AND %

HEATING 51 %

COOLING %

VENTILATION %

LIGHTING 15 %

MOTORS/PUMPS %

LOSSES 34 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING Teacherage Triplex

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	41	6	3 (1)									
SAVINGS PER UNIT $/Y	31	50	130									
TOTAL ENERGY SAVINGS $/Y	1271	300	390									
COMBINED ENERGY SAVINGS $/Y	1961											
UNIT RETROFIT COST $	9.20	140	254									
TOTAL RETROFIT COST $	377	840	762									
COMBINED RETROFIT COST $	1979											
UNIT FUEL SAVING, L	75	123	290									
TOTAL FUEL SAVING, L	3075	738	870									
COMBINED FUEL SAVINGS, L	4683											
UNIT ELECTRIC SAVING,KW			90									
TOTAL ELECTRIC SAVING,KW			270									
COMBINED ELECTRIC SAVING,KW	270											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	181											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	509											
PAYBACK PERIOD YRS	< 1	1.4	2									

(1) $3^{0}C/6$ hours

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
665 GJ	100%		484 GJ

TOTAL

SAVINGS

181 GJ/YEAR

27 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 665 GJ
SUGGESTED ECM2 SAVINGS 181 GJ
FUTURE ANNUAL ENERGY TARGET 484 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL =	180,000	MJ =	4683	litres
GAS =		MJ =		m3
ELEC =	1,000	MJ =	270	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Community Hall

LOCATION Deschambault Lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Assembly

CLASSIFICATION Institution
OCCUPANCY TYPE B
OCCUPANCY AVERAGE NA
AGE OF BUILDING Na
LAST MAJOR RENOVATION DATES

SIZE 173 **m2**

BEPI (ACTUAL) 1809
BEPI (TARGET) 1115

BUILDING CONTACT PERSON:
NAME Peter Beatty
TITLE Sec.
PHONE 632-4522
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 2
DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA
TEAM LEADER

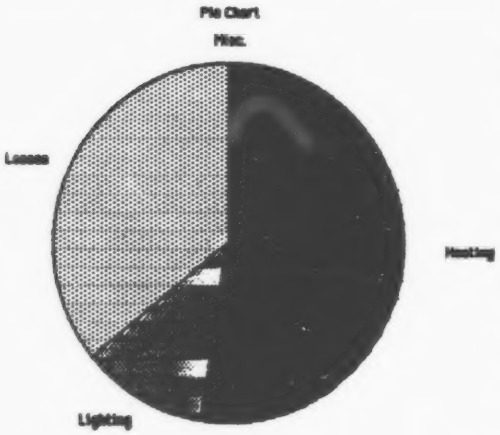
DESCRIPTION Single story wood frame & sided gable roof bldg with insulated crawl space, oil fire heating. Retrofit recommended weather stripping, change window glides, use econo lamps, use set back thermostat and upgrade ceiling insulation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	276 GJ	E.F.F. LOSSES	121 GJ
ELEC	37.7	HEATING	181
SOLAR GAIN		COOLING	
		LIGHTING	37
		MOTORS	
TOTALS	313 GJ		
		TOTAL OUT	340 GJ

TOTAL ENERGY CONSUMED	100%	313	GJ
WEATHER SENSITIVE PORTION OF ENERGY	88%	276	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	12%	37	GJ



USAGE PIE CHART AND %

HEATING 54 %

COOLING %

VENTILATION %

LIGHTING 11 %

MOTORS/PUMPS %

LOSSES 35 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING Community Hall

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	(1) OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS		3	2 (2)	173	4				NA			
SAVINGS PER UNIT $/Y		50	300	3.45	18				3.92			
TOTAL ENERGY SAVINGS $/Y		150	600	596	72							
COMBINED ENERGY SAVINGS $/Y	1418											
UNIT RETROFIT COST $		140	254	17.30	100				3.30			
TOTAL RETROFIT COST $		420	508	2992	400							
COMBINED RETROFIT COST $	4320											
UNIT FUEL SAVING, L		123	560	8.40	43							
TOTAL FUEL SAVING, L		369	1120	1453	172							
COMBINED FUEL SAVINGS, L	3114											
UNIT ELECTRIC SAVING, KW			185						10			
TOTAL ELECTRIC SAVING, KW			370									
COMBINED ELECTRIC SAVING, KW	370											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	120											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	694											
PAYBACK PERIOD YRS		2.7	< 1	5	5				1			

(1) Window Glide upgrading

(2) 12 hrs/D/6°C

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
313 GJ	100%		193 GJ

TOTAL

SAVINGS

120 GJ/YEAR

38 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 313 GJ
SUGGESTED ECM2 SAVINGS 120 GJ
FUTURE ANNUAL ENERGY TARGET 193 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 119,000 MJ = 3114 litres
GAS = MJ = m3
ELEC = 1,330 MJ = 370 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING RCMP office

LOCATION Deschambault Lake Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 2

AGE OF BUILDING Na

LAST MAJOR RENOVATION DATES

SIZE 27.6 **m2**

BEPI (ACTUAL) 1376

BEPI (TARGET)

BUILDING CONTACT PERSON:

NAME SGT. Wilkinson

TITLE Property Manager

PHONE 359-6445

PHOTOGRAPHS AVAILABLE YES x **NO**

NUMBER 3

DESCRIBE Front & 2 sides

ENERGY AUDIT SURVEY DATA

DATE

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Atco type portable metal clad trailer with crawl space. Oil heating with air conditioner. Good condition. Alum slider windows. Retrofit recommendations tempature set back (3 degrees C)

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 29 GJ

ELEC 9

SOLAR GAIN ____

____ ____

____ ____

____ ____

TOTALS 38 GJ

ENERGY OUT

E.F.F. LOSSES 31 GJ

HEATING 47

COOLING ____

LIGHTING 9.8

MOTORS ____

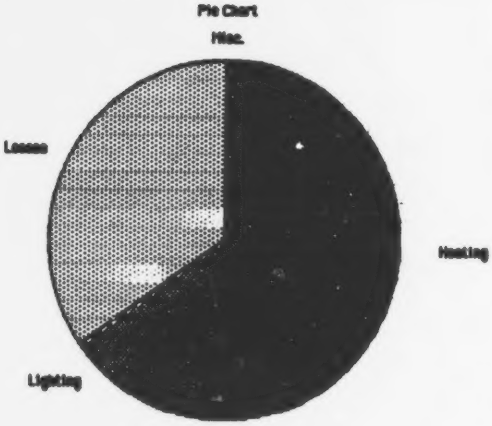
____

____

____

TOTAL OUT 87.8 GJ
Without Temp set back.

TOTAL ENERGY CONSUMED 100% ____ GJ
WEATHER SENSITIVE PORTION OF ENERGY % ____ GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY % ____ GJ



USAGE PIE CHART AND %

HEATING 53 %

COOLING 8 %

VENTILATION ____ %

LIGHTING 4 %

MOTORS/PUMPS ____ %

LOSSES 35 %

MISC ____ %

____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING RCMP Office

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS												
SAVINGS PER UNIT $/Y												
TOTAL ENERGY SAVINGS $/Y												
COMBINED ENERGY SAVINGS $/Y												
UNIT RETROFIT COST $												
TOTAL RETROFIT COST $												
COMBINED RETROFIT COST $												
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L												
COMBINED FUEL SAVINGS, L												
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW												
COMBINED ELECTRIC SAVING,KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ												
COMBINED UNIT ENERGY SAVING, (MJ/M2)												
PAYBACK PERIOD YRS												

No Retrofit Recommendations

5. BUILDING SURVEY REPORT

BUILDING Band Office
Peter Ballantyne Band
LOCATION Deschambault Lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 2
AGE OF BUILDING 1972
LAST MAJOR RENOVATION DATES Na

SIZE 53.3 **m2**
(97.9) Total

BEPI (ACTUAL) NA
BEPI (TARGET) Reduction of 969Mj

BUILDING CONTACT PERSON:
NAME George Sewap
TITLE Administrator
PHONE 632-4507
PHOTOGRAPHS AVAILABLE YES ___ **NO** ___
NUMBER 2
DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE Aug 8/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Pollack

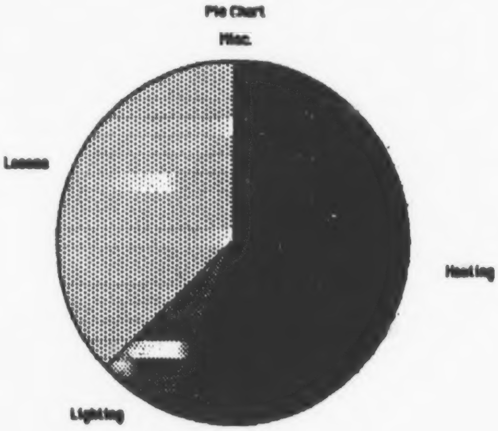
DESCRIPTION Wood frame single story gable roof bldg with crawl space & oil fired heating. Vinyl slider windows. Retrofit, insulate ceiling, weather strip door & temp. set back stat.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		**ENERGY OUT**	
FUELS	NA GJ	E.F.F. LOSSES	78 GJ
ELEC	13	HEATING	117
SOLAR GAIN		COOLING	
		LIGHTING	13
		MOTORS	
TOTALS	NA GJ		
		TOTAL OUT	208 GJ

TOTAL ENERGY CONSUMED 100% NA GJ
WEATHER SENSITIVE PORTION OF ENERGY % ____ GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY % ____ GJ



USAGE PIE CHART AND %

HEATING 56 %
COOLING ____ %
VENTILATION ____ %
LIGHTING 7 %
MOTORS/PUMPS ____ %
LOSSES 37 %
MISC ____ %
____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING Band Office

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	8.5	2	1	97								
SAVINGS PER UNIT $/Y	31	50	400	3.45								
TOTAL ENERGY SAVINGS $/Y	263	100	400	334								
COMBINED ENERGY SAVINGS $/Y	1097											
UNIT RETROFIT COST $	9.20	139.60	254	17.3								
TOTAL RETROFIT COST $	78	279	254	1678								
COMBINED RETROFIT COST $	2289											
UNIT FUEL SAVING, L	75	123		8.4								
TOTAL FUEL SAVING, L	637	246	747	814								
COMBINED FUEL SAVINGS, L	2444											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			247									
COMBINED ELECTRIC SAVING, KW	247											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	94.9											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	969											
PAYBACK PERIOD YRS	<1	2.7	<1	5								

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

208 GJ 100%
Calculated

TOTAL

SAVINGS

94.9 GJ/YEAR

45 %

% + GJ OF EACH ENERGY TYPE

19__ ANNUAL ENERGY CONSUMPTION NA ____________ GJ
SUGGESTED ECM2 SAVINGS ____________ GJ
FUTURE ANNUAL ENERGY TARGET ____________ GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 94,000 MJ = 2444 litres
GAS = ____________ MJ = ____________ m3
ELEC = 889 MJ = 247 KWH
OTHERS ____________ MJ = ____________
____________ MJ = ____________

5. BUILDING SURVEY REPORT

BUILDING Community Rink

LOCATION Deschambault Lake Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Recreation

CLASSIFICATION Institution

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 40+

AGE OF BUILDING 1979

LAST MAJOR RENOVATION DATES

SIZE 2009 **m2**
208 Heated

BEPI (ACTUAL) 662

BEPI (TARGET) 577

BUILDING CONTACT PERSON:

NAME Peter Beatty

TITLE Sec.

PHONE 632-4522

PHOTOGRAPHS AVAILABLE YES ___ **NO** x

NUMBER

DESCRIBE·

ENERGY AUDIT SURVEY DATA

DATE 1985

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Pre Fab rigid frame steel building ice arena with one end partition off within steel building, slab on grade floor, furred partition, R12 walls R20 ceiling. Poor floor perimeter insulation, retrofit suggested heat recover, interlocked with foyer lights, exterior grade beam insulation, Up Grade beam insulation. Up grade ceiling insulation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 1261 GJ

ELEC 69

SOLAR GAIN ______

TOTALS 1330 GJ

ENERGY OUT

E.F.F. LOSSES 398 GJ

HEATING 443

COOLING ______

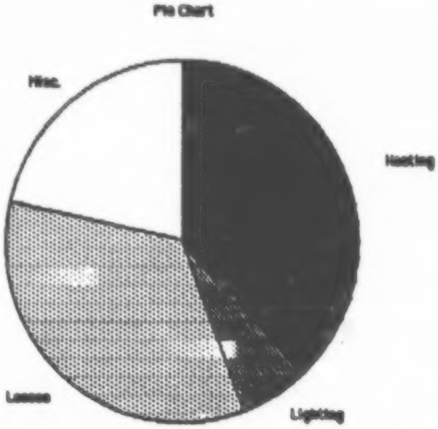
LIGHTING } 69

MOTORS }

HW 241

TOTAL OUT 1151 GJ

TOTAL ENERGY CONSUMED	100%	1330	GJ
WEATHER SENSITIVE PORTION OF ENERGY	100 %	1330	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	%		GJ



USAGE PIE CHART AND %

HEATING 38 %

COOLING ______ %

VENTILATION ______ %

LIGHTING 6 %

MOTORS/PUMPS ______ %

LOSSES 35 %

MISC 21 %

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING Community Rink

OP20

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Exterior (3) Perimeter Ins. Grade OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Half 400W/MV Rink Lamps to 250W/HPS OTHERS	OTHERS
NUMBER OF UNITS			1	208	26			1(1)	55		22	4
SAVINGS PER UNIT $/Y			400(2)	3.45	37			575	3.92		36	84
TOTAL ENERGY SAVINGS $/Y				717	962				215		792	336
COMBINED ENERGY SAVINGS $/Y	3022											
UNIT RETROFIT COST $			254	17.30	64			5890	3.30		53	261
TOTAL RETROFIT COST $				3598	1664				181		1166	1044
COMBINED RETROFIT COST $	7653											
UNIT FUEL SAVING, L				8.40	92.5							
TOTAL FUEL SAVING, L				1747	2405							
COMBINED FUEL SAVINGS, L	4152											
UNIT ELECTRIC SAVING, KW									10		92	215
TOTAL ELECTRIC SAVING, KW									550		2024	860
COMBINED ELECTRIC SAVING, KW	3434											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	171											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	764 (heated Portion)											
PAYBACK PERIOD YRS				5	2					1	1 1/2	3.1

(1) Oil fired when available
(2) With Adequate furnace
(3) Area should be properly drained

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
1330 GJ	100%		1159 GJ
TOTAL			

SAVINGS

171 GJ/YEAR

13 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1330 GJ
SUGGESTED ECM2 SAVINGS 171 GJ
FUTURE ANNUAL ENERGY TARGET 1159 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 159,000 MJ = 4152 litres
GAS = MJ = m3
ELEC = 12,000 MJ = 3434 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Power Plant
(Diesel)
LOCATION Deschambault Lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Power Generation

CLASSIFICATION	Institutional
OCCUPANCY TYPE	None
OCCUPANCY AVERAGE	
AGE OF BUILDING	NA
LAST MAJOR RENOVATION DATES	Periodically replaced with overhaul units

SIZE m2
BEPI (ACTUAL) NA
BEPI (TARGET)

BUILDING CONTACT PERSON:
NAME North-Sask Electric Ltd
TITLE W.C. McLachlan Manager
PHONE 425-2019
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 3
DESCRIBE Front, back & side

ENERGY AUDIT SURVEY DATA

DATE
SURVEY TYPE # None

SURVEY BY: COMPANY NAME
TEAM LEADER

DESCRIPTION 1-150 1-250 & 1-250 skid Mt'd trailer units insulated armco buildings with engine cooling fan dis charge interconnected with inter buildings air plenum for space heating, no surplus for heat recovery at extrem temp. Retrofit recommendation elec fan clutch.

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING North Sask Electric Diesel Power Plant

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Elec. Clutch Rad Fan OTHERS	OTHERS
NUMBER OF UNITS											3	
SAVINGS PER UNIT $/Y												
TOTAL ENERGY SAVINGS $/Y											5333 (2)	
COMBINED ENERGY SAVINGS $/Y	5333 (1)											
UNIT RETROFIT COST $											4500	
TOTAL RETROFIT COST $											13,500	
COMBINED RETROFIT COST $	13,500											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L											13,333	
COMBINED FUEL SAVINGS, L	13,333											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW												
COMBINED ELECTRIC SAVING,KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	513											
COMBINED UNIT ENERGY SAVING, (MJ/M2)												
PAYBACK PERIOD YRS											2.5	

(1) 40¢/L

(2) $0.4 \times \frac{6\ KW\ Fan}{150KW \times 6LF} \times 500{,}000\ L. \times \$0.40/L = \$5333/y$

(3) 60% LF smallest Unit

5. BUILDING SURVEY REPORT

BUILDING Health Clinic

LOCATION Deschambault Lake
Sask.

Fed Dept H & W Canada

EMR FILE #

BUILDING PRIMARY USE Office Clinic

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 4

AGE OF BUILDING 1981

LAST MAJOR RENOVATION DATES

SIZE 172 **m2**

BEPI (ACTUAL) 4703

BEPI (TARGET) 4166

BUILDING CONTACT PERSON:

NAME Bhinji

TITLE

PHONE 764-9111

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 2

DESCRIBE · Front & Back

ENERGY AUDIT SURVEY DATA

DATE Aug 7/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave

TEAM LEADER Pollock

DESCRIPTION Single story wood frame & sided gable roof bldg with insulated crawl space, propane fired furnace. Relatively new building in good shape. Retrofit suggest temp. set back stat (3degrees C) outside air control, exhaust heat rec. Econo watt type f. lamps.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 692 GJ

ELEC 117

SOLAR GAIN

TOTALS 809 GJ

ENERGY OUT

E.F.F. LOSSES 188 GJ

HEATING 148

COOLING

LIGHTING } 117

MOTORS }

VENT 119 Low

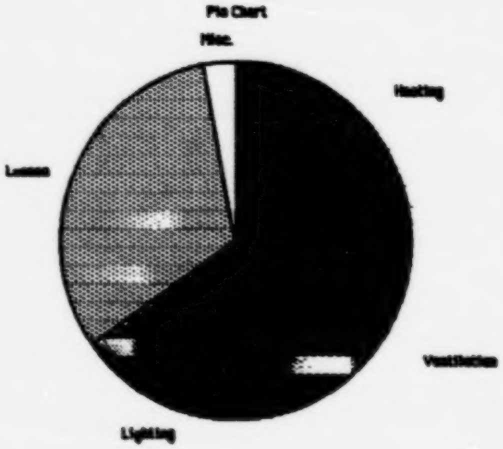
20

TOTAL OUT 592 GJ

TOTAL ENERGY CONSUMED 100% 809 GJ

WEATHER SENSITIVE PORTION OF ENERGY 82% 663 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY 18% 146 GJ



USAGE PIE CHART AND %

HEATING 25 %

COOLING %

VENTILATION 20 %

LIGHTING } %

MOTORS/PUMPS } 20 %

LOSSES 32 %

MISC 3 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Deschambault Lake BUILDING Nursing Clinic

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Exhaust Heat Recovery OTHERS	MANUAL VENTILATION CONTROL	OP #14 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OP #20 Low Wattage Exterior Lights OTHERS	OTHERS
NUMBER OF UNITS		(1)	1(2)		2		1	1	44		4	
SAVINGS PER UNIT $/Y					583			614(3)	3.92		84	
TOTAL ENERGY SAVINGS $/Y			200		1066		911		172		336	
COMBINED ENERGY SAVINGS $/Y	2685											
UNIT RETROFIT COST $					2000			4342	6.59		261	
TOTAL RETROFIT COST $			254		4000		1850		290		1044	
COMBINED RETROFIT COST $	7438											
UNIT FUEL SAVING, L					288							
TOTAL FUEL SAVING, L			373		576		1221					
COMBINED FUEL SAVINGS, L	2170											
UNIT ELECTRIC SAVING,KW									10		215	
TOTAL ELECTRIC SAVING,KW			123				1048		440		860	
COMBINED ELECTRIC SAVING,KW	2471											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	92.4											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	537											
PAYBACK PERIOD YRS			2		4		2	7.0	1.7		3.1	

(1) adjustment Required
(2) 3°C
(3) 20% x $4093 x 75% (Vapourizer & HW) = $614/yr

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
809 GJ	100%		716.6 GJ

TOTAL

SAVINGS

92.4 GJ/YEAR

11.4 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 809 GJ
SUGGESTED ECM2 SAVINGS 92.4 GJ
FUTURE ANNUAL ENERGY TARGET 716.6 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 83,500 MJ = 2170 litres
GAS = MJ = m^3
ELEC = 8,900 MJ = 2471 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING COMMUNITY COMPLEX

LOCATION Fond du lac
Saskatchewan

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Office-Community Hall

CLASSIFICATION C institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 6+

AGE OF BUILDING

LAST MAJOR RENOVATION DATES 1983

SIZE 447.3 **m2**

BEPI (ACTUAL) 3150

BEPI (TARGET) 1887

BUILDING CONTACT PERSON:

NAME Donald Duronger

TITLE

PHONE 686-2102

PHOTOGRAPHS AVAILABLE YES x **NO**

NUMBER 1

DESCRIBE · Front of building

ENERGY AUDIT SURVEY DATA

DATE 13/12/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION new building, single story, wood frame & sided, heated crawl space, oil fired furnaces, R20 walls/r40 ceilings. crawl space vents damaged and some open, furnace covers off. Recommedned retrofits, temp set back thermostats, outside vent control on furnaces, econo lamps, HPS exterior fixtures, repair crawl space vents and keep fan covers on furnace.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 1229 GJ

ELEC 180

SOLAR GAIN ______

TOTALS 1409 GJ

ENERGY OUT

E.F.F. LOSSES 342 GJ

HEATING 513

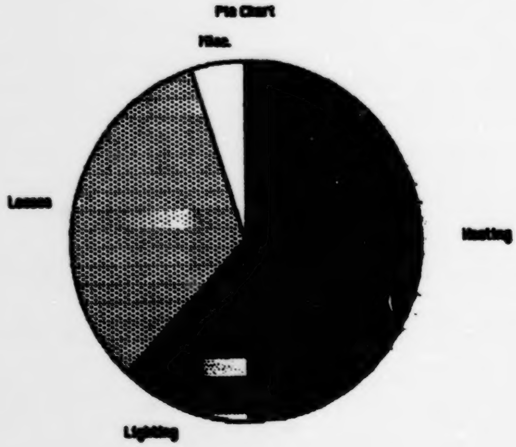
COOLING ______

LIGHTING } 125

MOTORS }

TOTAL OUT 1035 GJ

TOTAL ENERGY CONSUMED	100%	1409	GJ
WEATHER SENSITIVE PORTION OF ENERGY	88 %	1229	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	12 %	180	GJ



USAGE PIE CHART AND %

HEATING 50 %

COOLING ______ %

VENTILATION ______ %

LIGHTING } %

MOTORS/PUMPS } 12 %

LOSSES 33 %

MISC 5 %

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING Band Office & Hall Complex

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL(1) VENTILATION CONTROL	MANUAL (1) OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Repair Crawl Space vents Keep fan covers on OTHERS	OTHERS
NUMBER OF UNITS			4				4		242			
SAVINGS PER UNIT $/Y			400				502		2.94(2)		20% ±	
TOTAL ENERGY SAVINGS $/Y			1600				2008		711		2655	
COMBINED ENERGY SAVINGS $/Y	6974											
UNIT RETROFIT COST $			254				1520		6.59			
TOTAL RETROFIT COST $			1016				6080		1594		500	
COMBINED RETROFIT COST $	9190											
UNIT FUEL SAVING, L			747				1221					
TOTAL FUEL SAVING, L			2988				4884				6547	
COMBINED FUEL SAVINGS, L	14,419											
UNIT ELECTRIC SAVING, KW			247						7.5			
TOTAL ELECTRIC SAVING, KW			988						1815			
COMBINED ELECTRIC SAVING, KW	2803											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	565											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1263											
PAYBACK PERIOD YRS			<1				3		2.3		<1	

(1) with auto reset to off position at noon, 6PM and 12PM
(2) overall average taken as 6 hrs/D

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 **AFTER**

1409 GJ 100% 844 GJ/y

TOTAL

SAVINGS

565 GJ/YEAR

40 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1409 GJ
SUGGESTED ECM2 SAVINGS 565 GJ
FUTURE ANNUAL ENERGY TARGET 844 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	555,000	MJ =	14,419	litres
GAS =		MJ =		m3
ELEC =	10,000	MJ =	2803	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Portable Class Rooms (three units)
LOCATION Fond du lac Saskatchewan
Fed Dept DIAND
EMR FILE # HotCan #FDL3.2

BUILDING PRIMARY USE Class room

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE
AGE OF BUILDING 1981
LAST MAJOR RENOVATION DATES

SIZE 98X3 Units m2
BEPI (ACTUAL) 5578 Pro rated
BEPI (TARGET) 4653

BUILDING CONTACT PERSON:
NAME Richard Burke
TITLE Principal
PHONE 686-2833
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 1
DESCRIBE Front view

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Single story, wood frame & sided bldg. gable roof. insulated floor, oil furnace heating, one classroom sidewall exhaust fan reportedly not used in winter, three identical buildings. retrofit suggested weather strip doors,outside air control. & temp set back thermostats.

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
2952 GJ 100%		2439 GJ
TOTAL		
Oil 67% 1991		Oil 63% 1545
Power 33% 961	SAVINGS 513 GJ/YEAR 17 %	Power 37% 894

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 2952 GJ
SUGGESTED ECM2 SAVINGS 513 GJ
FUTURE ANNUAL ENERGY TARGET 2439 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

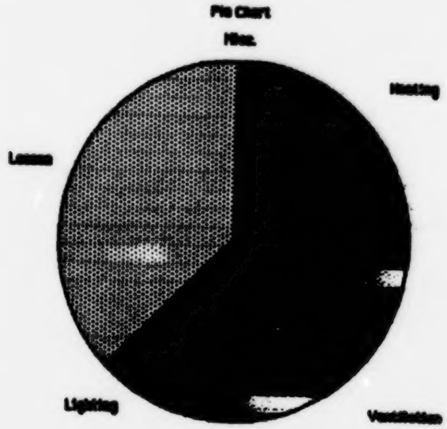
OIL = 446,000 MJ = 11,598 litres
GAS = MJ = m3
ELEC = 67,000 MJ = 18,757 KWH
OTHERS MJ =
MJ =

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		**ENERGY OUT**	
FUELS	1542 GJ/3 units	E.F.F. LOSSES	626 GJ
ELEC	98	HEATING	394
SOLAR GAIN		COOLING	
		LIGHTING MOTORS	98
		VENT & INF	545
TOTALS	1640 GJ		
		TOTAL OUT	1663 GJ

TOTAL ENERGY CONSUMED	100%	1640	GJ Pro rated
WEATHER SENSITIVE PORTION OF ENERGY	94 %	1542	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	6 %	98	GJ



USAGE PIE CHART AND %

HEATING 24 %

COOLING %

VENTILATION & INF 33 %

LIGHTING 6 %

MOTORS/PUMPS %

LOSSES 37 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING School - 3 Portable Classrooms

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	OP #14 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS		6	3				3		108			
SAVINGS PER UNIT $/Y		50	400				911		3.92			
TOTAL ENERGY SAVINGS $/Y		300	1200				2733		423			
COMBINED ENERGY SAVINGS $/Y	4656											
UNIT RETROFIT COST $		139	254				1850		6.59			
TOTAL RETROFIT COST $		834	762				550		711			
COMBINED RETROFIT COST $	7857											
UNIT FUEL SAVING, L		123	747				1221					
TOTAL FUEL SAVING, L		738	2241				3663					
COMBINED FUEL SAVINGS, L	6642											
UNIT ELECTRIC SAVING,KW			247				1048		10			
TOTAL ELECTRIC SAVING,KW			741				3144		1080			
COMBINED ELECTRIC SAVING,KW	4965											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	272											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	925											
PAYBACK PERIOD YRS		2.7	< 1				2		1.7			

ENERGY SOURCES & TARGETS

BEFORE   IMPLEMENTATION OF ECM2   AFTER

1640 GJ   100%   1368 GJ

TOTAL

BEFORE		AFTER
Oil 94% 1542		Oil 94% 1287
Power 6% 98	SAVINGS	Power 6% 81

272 GJ/YEAR

16 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1640 GJ
SUGGESTED ECM2 SAVINGS 272 GJ
FUTURE ANNUAL ENERGY TARGET 1368 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 255,000 MJ = 6642 litres
GAS = MJ = m3
ELEC = 17,000 MJ = 4965 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING School

LOCATION Fond du lac
Saskatchewan

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE

AGE OF BUILDING PRE 1969

LAST MAJOR RENOVATION DATES 3 since 1969

SIZE 685.8 **m2**

BEPI (ACTUAL) 5552

BEPI (TARGET) 4660

BUILDING CONTACT PERSON:

NAME Richard Burke

TITLE Principal

PHONE 686-2833

PHOTOGRAPHS AVAILABLE YES x **NO**

NUMBER 2

DESCRIBE Front view
Rear view

ENERGY AUDIT SURVEY DATA

DATE 7/8/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave

TEAM LEADER

DESCRIPTION See following page

Description Fond du Lac School

This institution is a multiple building complex consisting of main school building, a gym and three portable class rooms. The main building was originally constructed before 1969 and renovated three times after that date.

The building is a wood frame and sided structure mostly single story with an insulated floor over a non heated crawl space, there is a small concrete wall basement section (232 m^2).

This building is due for replacement in the near future therefore only short term retrofit measures are considered. The most apparent conservation item has to do with maintaining the furnace fan covers in place otherwise large quantities of outside air are drawn through the combustion air supply in the furnace rooms and vented through the classrooms continuously including the non occupied periods. This has probably been done to provide ventilation for occupied class rooms as there are no other forms of ventilation for some rooms.

The furnace should be equipped with a remote ventilation switch or programmable clock control from the administration office to permit the switching of furnace fans "on" for continuous operation and outside air ventilation during classroom occupancy. Other retrofit measures suggested for consideration are vinyl film on windows in administration areas, door weather stripping, temperature set-back stats and use of econo fluorescent lamps.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 3579 GJ Pro-Rated

ELEC 229

SOLAR GAIN ____

TOTALS 3808 GJ

ENERGY OUT

E.F.F. LOSSES 1340 GJ

HEATING 585

COOLING ____

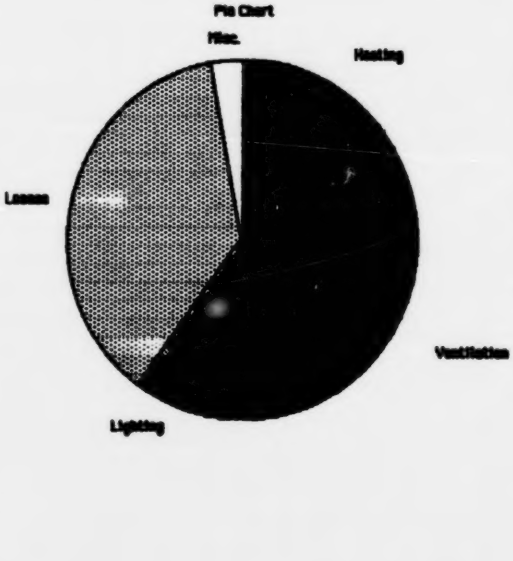
LIGHTING 229

MOTORS ____

HWH 104

TOTAL OUT 3578 GJ

TOTAL ENERGY CONSUMED	100%	3808	GJ
WEATHER SENSITIVE PORTION OF ENERGY	90%	3406	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	10%	402	GJ



USAGE PIE CHART AND %

HEATING 16 %

COOLING ____ %

VENTILATION & INF 37 %

LIGHTING 7 %

MOTORS/PUMPS ____ %

LOSSES 37 %

MISC 3 %

____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond du Lac BUILDING School

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Furnace Fan Covers OTHERS	MANUAL VENTILATION CONTROL	OP #14 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	92 (1)	5	6		6		6		361			
SAVINGS PER UNIT $/Y	31	50	400		1200		911		3.92			
TOTAL ENERGY SAVINGS $/Y	285	250	2400		7200		5465		1415			
COMBINED ENERGY SAVINGS $/Y	17,015											
UNIT RETROFIT COST $	9.2	(2)	254				1850		6.59			
TOTAL RETROFIT COST $	84		1524				11,100		2378			
COMBINED RETROFIT COST $	15,086											
UNIT FUEL SAVING, L	75	123	747		2890		1221					
TOTAL FUEL SAVING, L	690	615	4482		17342		7326					
COMBINED FUEL SAVINGS, L	14,855											
UNIT ELECTRIC SAVING, KW			247				1048		10			
TOTAL ELECTRIC SAVING, KW			1482				6288		3610			
COMBINED ELECTRIC SAVING, KW	11380											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	612											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	892											
PAYBACK PERIOD YRS	< 1	2	< 1		< 1		2		1.7			

(1) Staff & Princ. & Lib

(2) Material On Site

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

3808 GJ 100% Prorated

3196 GJ

TOTAL

Oil
94%
3579

Power
6%
229

Oil
94%
3008

Power
6%
188

SAVINGS

612 GJ/YEAR

16 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 3808 GJ
SUGGESTED ECM2 SAVINGS 612 GJ
FUTURE ANNUAL ENERGY TARGET 3196 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 571,000 MJ = 14,855 litres
GAS = MJ = m3
ELEC = 41,000 MJ = 11,380 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING School Gymnasium

LOCATION Fond du lac
Sask.

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Gymnasium

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE

AGE OF BUILDING 1960

LAST MAJOR RENOVATION DATES

SIZE 196 **m2**

BEPI (ACTUAL) 5693 Pro rated

BEPI (TARGET) 5209 Figure

BUILDING CONTACT PERSON:

NAME Richard Burke

TITLE Principal

PHONE 686-2833

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 1

DESCRIBE Front View

ENERGY AUDIT SURVEY DATA

DATE Aug 7/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Sask. Power Corp.

TEAM LEADER Pollock

DESCRIPTION Single story, wood frame & sided mansard sloped roof, insulated floor, oil fired furnace, retrofit, weather stripping, temp set back, flor escent lamps for inc. seal off old window ports with caulking.

ENERGY BALANCE USAGE

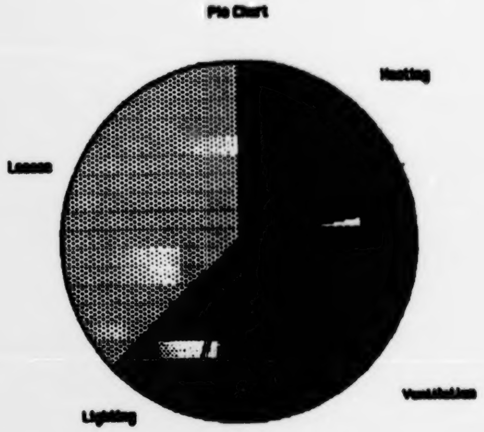
BALANCE

ENERGY IN			ENERGY OUT	
FUELS	1049 GJ	Pro Rated	**E.F.F. LOSSES**	294 GJ
ELEC	67		**HEATING**	177
SOLAR GAIN			**COOLING**	
			LIGHTING	67
			MOTORS	
TOTALS	1116 GJ		Vent	264
			TOTAL OUT	802 GJ

TOTAL ENERGY CONSUMED 100% 1049 GJ
WEATHER SENSITIVE PORTION OF ENERGY % ______ GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY 6 % 67 GJ

USAGE PIE CHART AND %

HEATING 22 %
COOLING ______ %
VENTILATION 33 %
LIGHTING 8 %
MOTORS/PUMPS ______ %
LOSSES 37 %
MISC ______ %
______ %



ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING School Mini Gym

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Furnace Covers On OTHERS	OP14 MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS		2	1		1	1				9		
SAVINGS PER UNIT $/Y		50								63		
TOTAL ENERGY SAVINGS $/Y		100	400		1200	911				567		
COMBINED ENERGY SAVINGS $/Y	1978											
UNIT RETROFIT COST $		139								88		
TOTAL RETROFIT COST $		278	254			1850				792		
COMBINED RETROFIT COST $	3174											
UNIT FUEL SAVING, L		123										
TOTAL FUEL SAVING, L		246	747			1221						
COMBINED FUEL SAVINGS, L	2214											
UNIT ELECTRIC SAVING,KW										160		
TOTAL ELECTRIC SAVING,KW			247			1048				1440		
COMBINED ELECTRIC SAVING,KW	2735											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	95											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	485											
PAYBACK PERIOD YRS		2.7	<1			2				1.4		

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
116 GJ	100%		1021 Gj
	TOTAL		
Oil 94% 1049			Oil 95% 964
Power 6% 67		SAVINGS 95 GJ/YEAR 9 %	Power 5% 57

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1116 GJ Pro Rated
SUGGESTED ECM2 SAVINGS 95 GJ
FUTURE ANNUAL ENERGY TARGET 1021 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 85,000 MJ = 2214 litres
GAS = MJ = m3
ELEC = 10,000 MJ = 2735 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Sask Tel CDO Bldg

LOCATION Fond du lac
Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Institutional - Equipment

CLASSIFICATION C institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE Intermitant

AGE OF BUILDING 1976

LAST MAJOR RENOVATION DATES

SIZE 46.8 **m2**

BEPI (ACTUAL) 995

BEPI (TARGET) 696

BUILDING CONTACT PERSON:

NAME Ed Splett - Sask Tel

TITLE Section Manager -Bldg & Towers

PHONE 347-2066

PHOTOGRAPHS AVAILABLE YES x **NO**

NUMBER 1

DESCRIBE Front View

ENERGY AUDIT SURVEY DATA

DATE

SURVEY TYPE # NA

SURVEY BY: COMPANY NAME

TEAM LEADER

DESCRIPTION Portable Atco type wood frame, metal clad trailer, electric heater & wall, air conditioner for equipment. Being elec heated, should be insulated to R30+ and temp set back used, doors & windows should also be included in modifications.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS ____________ GJ

ELEC 46.8

SOLAR GAIN ____________

TOTALS 46.8 GJ

ENERGY OUT

E.F.F. LOSSES ____________ GJ

HEATING 23

COOLING 7.3

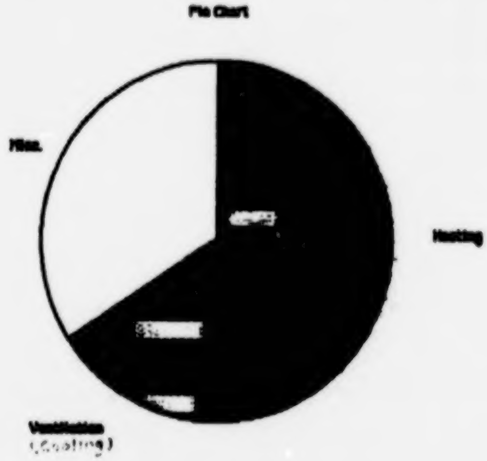
LIGHTING ____________

MOTORS ____________

EQUIP 15.7

TOTAL OUT 46.8 GJ

TOTAL ENERGY CONSUMED 100% 46.8 GJ
WEATHER SENSITIVE PORTION OF ENERGY 65 % 30.3 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY 35 % 16.5 GJ



USAGE PIE CHART AND %

HEATING 50 %

COOLING 16 %

VENTILATION ____________ %

LIGHTING ____________ %

MOTORS/PUMPS ____________ %

LOSSES ____________ %

MISC 34 %

____________ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING Sask Tel

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	R30+ Exterior INS OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Exterior S.Door OTHERS	3rd Windows OTHERS
NUMBER OF UNITS					100						1	2
SAVINGS PER UNIT $/Y					7.31							335
TOTAL ENERGY SAVINGS $/Y					731						126	670
COMBINED ENERGY SAVINGS $/Y	1526											
UNIT RETROFIT COST $					64							500
TOTAL RETROFIT COST $					6400						550	1000
COMBINED RETROFIT COST $	7950											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L												
COMBINED FUEL SAVINGS, L												
UNIT ELECTRIC SAVING,KW					18.7							854
TOTAL ELECTRIC SAVING,KW					1870						323	1708
COMBINED ELECTRIC SAVING,KW	3901											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	14											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	389											
PAYBACK PERIOD YRS					8						4.3	1.5

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
46.6GJ	100%		32.6 GJ
TOTAL			

SAVINGS

14 GJ/YEAR

30 %

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 46.6 GJ
SUGGESTED ECM2 SAVINGS 14.0 GJ
FUTURE ANNUAL ENERGY TARGET 32.6 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = ______ MJ = ______ litres
GAS = ______ MJ = ______ m3
ELEC = 14,000 MJ = 3901 KWH
OTHERS ______ MJ = ______
______ MJ = ______

5. BUILDING SURVEY REPORT

BUILDING Storage

LOCATION Fond Du Lac
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Storage

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE
AGE OF BUILDING
LAST MAJOR RENOVATION DATES

SIZE ____ **m2**

BEPI (ACTUAL) Unheated & non insulated
BEPI (TARGET) & no power

BUILDING CONTACT PERSON:
NAME Band
TITLE SEc
PHONE 686-2102
PHOTOGRAPHS AVAILABLE YES X **NO** ____
NUMBER 1
DESCRIBE - Front view

ENERGY AUDIT SURVEY DATA

DATE ____
SURVEY TYPE # ____

SURVEY BY: COMPANY NAME ____
TEAM LEADER ____

DESCRIPTION ____

5. BUILDING SURVEY REPORT

BUILDING Duplex Teacherage
Two Units
LOCATION Fond du lac
Saskatchewan
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Residence
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 4
AGE OF BUILDING 1972
LAST MAJOR RENOVATION DATES

SIZE 163.5 **m2**/Duplex
BEPI (ACTUAL) 2667
BEPI (TARGET) 2110

BUILDING CONTACT PERSON:
NAME Richard Burke
TITLE Principal
PHONE 686-2833
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 1
DESCRIBE · Rear view

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

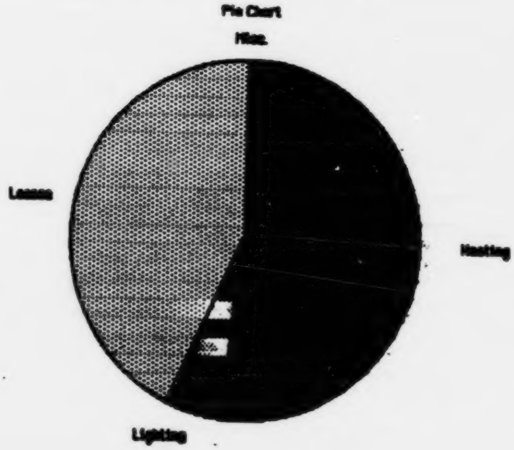
DESCRIPTION Wood frame structure gable roof, oil fired hot air heating. Retrofit recommendations, temp set back stats (3 degrees C) , Vinyl window film seal, door weather stripping, furnace filter replacement.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	416 GJ	E.F.F. LOSSES	155 GJ
ELEC	20	HEATING	190
SOLAR GAIN		COOLING	
		LIGHTING	20
		MOTORS	
		HWH	
TOTALS	436 GJ Pro Rated		
		TOTAL OUT	365 GJ

TOTAL ENERGY CONSUMED 100% 436 GJ
WEATHER SENSITIVE PORTION OF ENERGY % 416 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY % 20 GJ



USAGE PIE CHART AND %

HEATING 52 %
COOLING %
VENTILATION %
LIGHTING 5 %
MOTORS/PUMPS & HWH %
LOSSES 43 %
MISC %
%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING Duplex Teacherage (2 units) (1)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	17.2	4	2 (2)									
SAVINGS PER UNIT $/Y	31	50	130									
TOTAL ENERGY SAVINGS $/Y	533	200	260									
COMBINED ENERGY SAVINGS $/Y	993											
UNIT RETROFIT COST $	9.20	139	254									
TOTAL RETROFIT COST $	158	556	508									
COMBINED RETROFIT COST $	1222											
UNIT FUEL SAVING, L	75	123	290									
TOTAL FUEL SAVING, L	1290	492	580									
COMBINED FUEL SAVINGS, L	2362											
UNIT ELECTRIC SAVING, KW			90									
TOTAL ELECTRIC SAVING, KW												
COMBINED ELECTRIC SAVING, KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	91											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	556											
PAYBACK PERIOD YRS	< 1	2.7	2									

(1) Table refers to one duplex unit

(2) $3^{o}C/6hrs/D$

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
436 GJ	100%		345 GJ
	TOTAL		
Oil 95% 416			Oil 95% 325
Power 5% 20		SAVINGS 91 GJ/YEAR 20 %	Power 5% 20

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 436 GJ
SUGGESTED ECM2 SAVINGS 91 GJ
FUTURE ANNUAL ENERGY TARGET 345 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL =	91,000	MJ =	2362	litres
GAS =		MJ =		m^3
ELEC =	300	MJ =	90	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Teacherage (Two Units)

LOCATION Fond Du Lac
Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION A Residence

OCCUPANCY TYPE A

OCCUPANCY AVERAGE 2

AGE OF BUILDING 1983-84

LAST MAJOR RENOVATION DATES

SIZE 78 **m2**

BEPI (ACTUAL) 2661

BEPI (TARGET) 2179

BUILDING CONTACT PERSON:

NAME Richard Burke

TITLE Principal

PHONE 685-2833

PHOTOGRAPHS AVAILABLE YES x **NO**

NUMBER Rear view (back door)

DESCRIBE

ENERGY AUDIT SURVEY DATA

DATE 13/12/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Single story wood frame & sided gable roof, wood basement (0.9 M above Gr.) oil fired hot air furnace & HWH. Relatively new buildings. Retrofit suggested. temp set back stat & vinyl window film.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 198 GJ Pro Rated

ELEC 9.6

SOLAR GAIN

TOTALS 207.6 GJ /Unit

ENERGY OUT

E.F.F. LOSSES 66 GJ

HEATING 98

COOLING

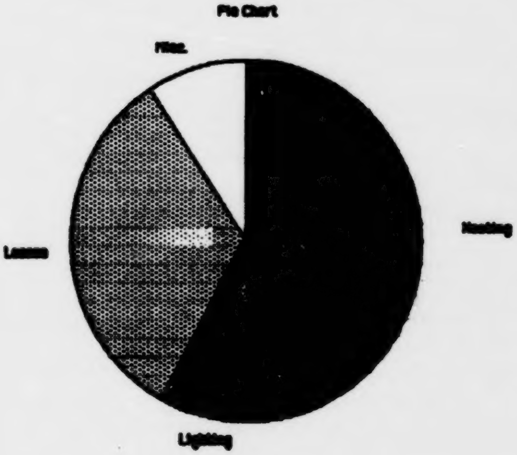
LIGHTING 18

MOTORS

HWH 18

TOTAL OUT 200 GJ

TOTAL ENERGY CONSUMED	100%	207	GJ
WEATHER SENSITIVE PORTION OF ENERGY	87%	180	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	13%	27	GJ



USAGE PIE CHART AND %

HEATING 49 %

COOLING %

VENTILATION %

LIGHTING 9 %

MOTORS/PUMPS %

LOSSES 33 %

MISC 9 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING Teacherages (2 singles)
Per Unit

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	9		1(1)									
SAVINGS PER UNIT $/Y	31											
TOTAL ENERGY SAVINGS $/Y	279		130									
COMBINED ENERGY SAVINGS $/Y	409											
UNIT RETROFIT COST $	9.2											
TOTAL RETROFIT COST $	82		254									
COMBINED RETROFIT COST $	336											
UNIT FUEL SAVING, L	75											
TOTAL FUEL SAVING, L	675		290									
COMBINED FUEL SAVINGS, L	965											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			90									
COMBINED ELECTRIC SAVING, KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	37											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	478											
PAYBACK PERIOD YRS	< 1											

(1) 3°C

ENERGY SOURCES & TARGETS

BEFORE **IMPLEMENTATION OF ECM2** **AFTER**

207 GJ 100% 170 GJ

TOTAL

SAVINGS

37 GJ/YEAR

17 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 207 GJ Pro rated
SUGGESTED ECM2 SAVINGS 37 GJ
FUTURE ANNUAL ENERGY TARGET 170 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 37,000 MJ = 965 litres
GAS = MJ = m3
ELEC = 300 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherage

LOCATION Fond du lac

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Residential

OCCUPANCY TYPE A

OCCUPANCY AVERAGE 2

AGE OF BUILDING 1968

LAST MAJOR RENOVATION DATES 1984

SIZE 89 **m2**

BEPI (ACTUAL) 2640

BEPI (TARGET) 1224

BUILDING CONTACT PERSON:

NAME Richard Burke

TITLE Principal

PHONE 686-2833

PHOTOGRAPHS AVAILABLE YES ___ **NO** X

NUMBER

DESCRIBE

ENERGY AUDIT SURVEY DATA

DATE 13/12/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

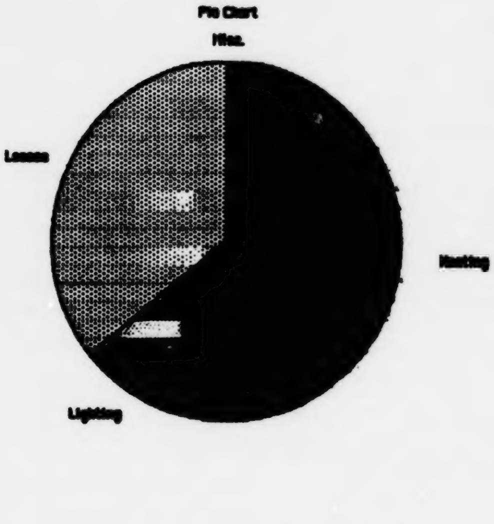
DESCRIPTION Single story wood frame and sided gable roof house with concrete basement 3' above grade, oil fired furnace. Under renovation, retrofit suggested, set back thermostat 3 degree C, vinyl window film, attic insulation & basement insulation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN			ENERGY OUT		
FUELS	224	GJ	E.F.F. LOSSES	142	GJ
ELEC	11	Pro rated	HEATING	213	
SOLAR GAIN			COOLING		
			LIGHTING	36	
			MOTORS		
			HWH		
TOTALS	235	GJ			
			TOTAL OUT	391	GJ

TOTAL ENERGY CONSUMED	100%	235	GJ Pro rated
WEATHER SENSITIVE PORTION OF ENERGY	5 %	11	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	95 %	224	GJ



USAGE PIE CHART AND %

HEATING 54 %

COOLING %

VENTILATION %

LIGHTING 10 %

MOTORS/PUMPS %

LOSSES 36 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Fond Du Lac BUILDING Teacherage (old Single)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	14		1	89	83(1)							
SAVINGS PER UNIT $/Y	31			3.45	5.78							
TOTAL ENERGY SAVINGS $/Y	434		130	307	480							
COMBINED ENERGY SAVINGS $/Y	1351											
UNIT RETROFIT COST $	9.20			17.30	10.25							
TOTAL RETROFIT COST $	128		254	1539	850							
COMBINED RETROFIT COST $	2771											
UNIT FUEL SAVING, L	75			8.40	14.2							
TOTAL FUEL SAVING, L	1050		290	747	1180							
COMBINED FUEL SAVINGS, L	3267											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			90									
COMBINED ELECTRIC SAVING, KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	126											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1415											
PAYBACK PERIOD YRS	< 1		2	5	2							

(1) R 7.4 to R20

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

235 GJ 100% Pro Rated 109 GJ

TOTAL

SAVINGS

126 GJ/YEAR

53 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 235 GJ
SUGGESTED ECM2 SAVINGS 126 GJ
FUTURE ANNUAL ENERGY TARGET 109 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 125,700 MJ = 3267 litres
GAS = MJ = m3
ELEC = 300 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING School
Northern Lights School Division
LOCATION Garson Lake
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 15
AGE OF BUILDING 1960
LAST MAJOR RENOVATION DATES NA

SIZE 179 **m2**
BEPI (ACTUAL) 5888
BEPI (TARGET) 4910

BUILDING CONTACT PERSON:
NAME Ron Waugh
TITLE Principal
PHONE YS3 3023
PHOTOGRAPHS AVAILABLE YES ___ **NO** X
NUMBER
DESCRIBE·

ENERGY AUDIT SURVEY DATA

DATE Aug 7, 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER

DESCRIPTION Two buildings, one log gable roof building and second is a 2 section portable (Atco Type) Retrofit suggested, weatherstripping attic insulation, general repairs (Holes and siding), Temp set backs stats. Bldgs reportedly very leaky.

ENERGY BALANCE USAGE

BALANCE

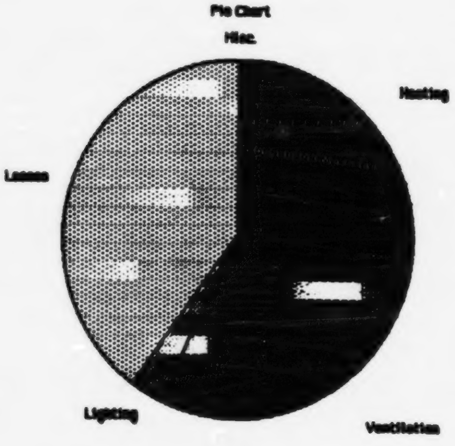
ENERGY IN

FUELS 1018 **GJ**
ELEC 36
SOLAR GAIN
TOTALS 1054 **GJ**

ENERGY OUT

E.F.F. LOSSES 406 **GJ**
HEATING 280
COOLING
LIGHTING } 36
MOTORS }
INFILT 330 (Balance)
TOTAL OUT 1054 **GJ**

TOTAL ENERGY CONSUMED **100%** 1054 **GJ**
WEATHER SENSITIVE PORTION OF ENERGY **%** 1018 **GJ**
NON-WEATHER SENSITIVE PORTION OF ENERGY **%** 36 **GJ**



USAGE PIE CHART AND %

HEATING 26 **%**
COOLING **%**
VENTILATION& INF. 31 **%**
LIGHTING **%**
MOTORS/PUMPS 3 **%**
LOSSES 40 **%**
MISC **%**
%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Garson Lake BUILDING School, Northern Lights School Division

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	6.1	3	2	186						36 (2)		
SAVINGS PER UNIT $/Y	31.1+	100 (1)+	400	3.45						63		
TOTAL ENERGY SAVINGS $/Y	189	300	800	641						1134		
COMBINED ENERGY SAVINGS $/Y	3064											
UNIT RETROFIT COST $	9.20	139.60	254	17.30						88		
TOTAL RETROFIT COST $	56	418	508	3217						1584		
COMBINED RETROFIT COST $	5783											
UNIT FUEL SAVING, L	75	246	747	8.40								
TOTAL FUEL SAVING, L	457	738	1494	1562								
COMBINED FUEL SAVINGS, L	4251											
UNIT ELECTRIC SAVING, KW			247							160		
TOTAL ELECTRIC SAVING, KW			494							2880		
COMBINED ELECTRIC SAVING, KW	3374											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	175											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	977											
PAYBACK PERIOD YRS	<1.0	1	<1.0	5.0						1.4		

(1) 51 to 17 m^3hr^{-1}

(2) 2-100 watt replaced with 2/40 watt f.

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

1054 GJ 879 GJ

100%

TOTAL

SAVINGS

175 GJ/YEAR

17 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1054 GJ
SUGGESTED ECM2 SAVINGS 175 GJ
FUTURE ANNUAL ENERGY TARGET 879 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 163,000 MJ = 4251 litres
GAS = MJ = m3
ELEC = 12,000 MJ = 3374 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherage
Northern Lights School Division
LOCATION Garson Lake
Sask.

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residential

CLASSIFICATION Residential
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 2
AGE OF BUILDING 8
LAST MAJOR RENOVATION DATES

SIZE 56.3 **m2**

BEPI (ACTUAL) 8650
BEPI (TARGET) 7282

BUILDING CONTACT PERSON:

NAME Ron Waugh
TITLE Principal
PHONE YS3 3023
PHOTOGRAPHS AVAILABLE YES ___ **NO** x
NUMBER
DESCRIBE·

ENERGY AUDIT SURVEY DATA

DATE 20/03/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Log wood building with gable roof, retrofit suggested weather stripping, vinyl window film, attic insulation, temp. set back stats(3 degrees.)

ENERGY BALANCE USAGE

BALANCE

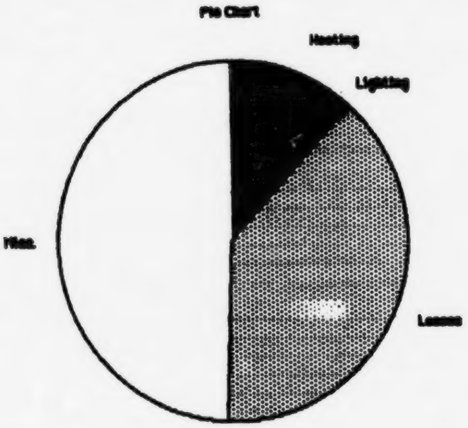
ENERGY IN

FUELS 487 GJ
ELEC na
SOLAR GAIN ______
______ ______
______ ______
______ ______
TOTALS 487 GJ

ENERGY OUT

E.F.F. LOSSES 190 GJ
HEATING 31
COOLING ______
LIGHTING 9 EST.
MOTORS ______
ELEC. HEATING 18
MISC. 238
______
TOTAL OUT 486 GJ

TOTAL ENERGY CONSUMED 100% 487 GJ
WEATHER SENSITIVE PORTION OF ENERGY % 9 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY % 478 GJ



USAGE PIE CHART AND %

HEATING 10 %
COOLING ______ %
VENTILATION ______ %
LIGHTING 2 %
MOTORS/PUMPS ______ %
LOSSES 39 %
MISC 49 %
______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Garson Lake BUILDING Teacherage

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	5.5	1(1)	1	56								
SAVINGS PER UNIT $/Y	31			3.45								
TOTAL ENERGY SAVINGS $/Y	170	150	400	193								
COMBINED ENERGY SAVINGS $/Y	913											
UNIT RETROFIT COST $	9.20	139	254	17.30								
TOTAL RETROFIT COST $	50.6	139	254	1124								
COMBINED RETROFIT COST $	1567											
UNIT FUEL SAVING, L	75	369	747	8.4								
TOTAL FUEL SAVING, L	412	369	747	470								
COMBINED FUEL SAVINGS, L	1998											
UNIT ELECTRIC SAVING, KW			247									
TOTAL ELECTRIC SAVING, KW												
COMBINED ELECTRIC SAVING, KW	247											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	77											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1367											
PAYBACK PERIOD YRS	< 1	1	< 1	5								

(1) 68 to 17 m^3/hr reduction

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

487 GJ

100%

TOTAL

SAVINGS

77 GJ/YEAR

16 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 487 GJ
SUGGESTED ECM2 SAVINGS 77 GJ
FUTURE ANNUAL ENERGY TARGET 410 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 76,000 MJ = 1998 litres
GAS = ______ MJ = ______ m^3
ELEC = 900 MJ = 247 KWH
OTHERS ______ MJ = ______
______ MJ = ______

5. BUILDING SURVEY REPORT

BUILDING PRR OFFICE

LOCATION Kinoosao
Sask.

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Conservation Office

CLASSIFICATION Institutional III
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 2
AGE OF BUILDING Est. 20
LAST MAJOR RENOVATION DATES recently

SIZE 53 **m2**

BEPI (ACTUAL) 1716
BEPI (TARGET) 1471

BUILDING CONTACT PERSON:
NAME Lloyd Whitehead
TITLE Area Manager
PHONE 922-2270
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 4
DESCRIBE Front , back & side

ENERGY AUDIT SURVEY DATA

DATE Aug.7/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE
TEAM LEADER POLLOCK

DESCRIPTION Story & half wood frame /wood siding building with no evidence of crawl space normal unoccupied during winter. Heated in spring & fall. Building in fair shape, office fuel consumption estimated 2250L/yr. residence 4500L/yr.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 87 GJ

ELEC 4

SOLAR GAIN

TOTALS 91 GJ

ENERGY OUT

E.F.F. LOSSES 34 GJ

HEATING 52

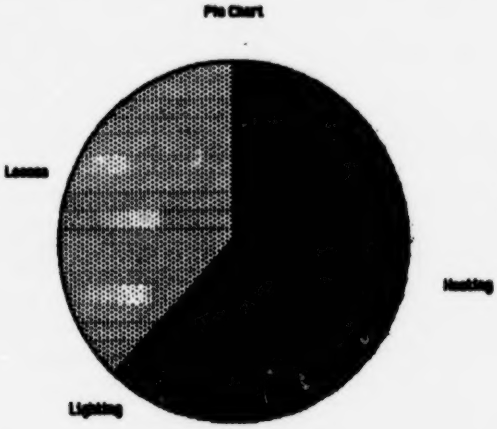
COOLING

LIGHTING 4

MOTORS

TOTAL OUT 91 GJ

TOTAL ENERGY CONSUMED	100%	91	GJ
WEATHER SENSITIVE PORTION OF ENERGY	97%	88	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	3%	3	GJ



USAGE PIE CHART AND %

HEATING 58 %

COOLING %

VENTILATION %

LIGHTING 4 %

MOTORS/PUMPS %

LOSSES 38 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Kinoosao BUILDING PRR Office

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	Option#18 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS			1							4		
SAVINGS PER UNIT $/Y										20		
TOTAL ENERGY SAVINGS $/Y			130							80		
COMBINED ENERGY SAVINGS $/Y	210											
UNIT RETROFIT COST $										42		
TOTAL RETROFIT COST $			254							168		
COMBINED RETROFIT COST $	422											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L			290									
COMBINED FUEL SAVINGS, L	290											
UNIT ELECTRIC SAVING,KW										51		
TOTAL ELECTRIC SAVING,KW										204		
COMBINED ELECTRIC SAVING,KW	204											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	12											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	226											
PAYBACK PERIOD YRS			2							2		

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 **AFTER**

91 GJ 100%

TOTAL

BEFORE	AFTER
95%	96%
87	74
Oil	Oil
4	3
Power	Power

SAVINGS

12 GJ/YEAR

12 %

% + GJ OF EACH ENERGY TYPE

1983-84 ANNUAL ENERGY CONSUMPTION 91 GJ
SUGGESTED ECM2 SAVINGS 12 GJ
FUTURE ANNUAL ENERGY TARGET 77 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 11,000 MJ = 290 litres
GAS = MJ = m3
ELEC = 734 MJ = 204 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING School (Apisasin)
Northern Lights School Division
LOCATION Kinoosao

Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 20
AGE OF BUILDING 25
LAST MAJOR RENOVATION DATES

SIZE 178 **m2**
BEPI (ACTUAL) 1544
BEPI (TARGET) 1062

BUILDING CONTACT PERSON:
NAME Willard Slippin
TITLE Principal
PHONE JR 32907
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 4
DESCRIBE Front, back, sides

ENERGY AUDIT SURVEY DATA

DATE Aug 7, 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE
TEAM LEADER POLLOCK

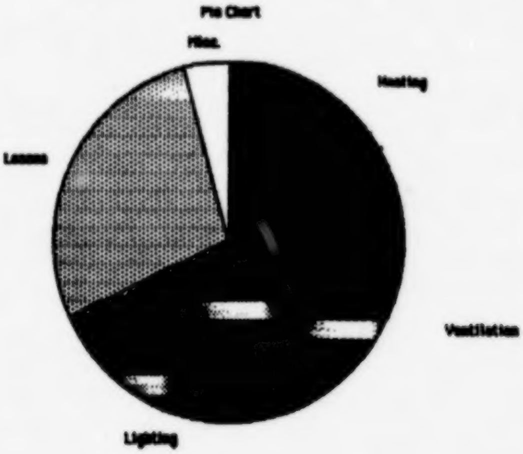
DESCRIPTION Four trailer unit interconnected wood frame, flat roof. Joist space, oil fired heating, electric water heater. Recommended set back thermostats (2) entrance foyer, replace inc. with F. socket lamps, use of F. econo watt type f. lamps & convert electric HWH to oil or gas fired.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	192 GJ	E.F.F. LOSSES	77 GJ
ELEC	83	HEATING & VENT	115
SOLAR GAIN		COOLING	
		LIGHTING	73.5
		MOTORS	
		HWH	9.5
TOTALS	275 GJ		
		TOTAL OUT	275 GJ

TOTAL ENERGY CONSUMED 100% 275 GJ
WEATHER SENSITIVE PORTION OF ENERGY % 70
NON-WEATHER SENSITIVE PORTION OF ENERGY % 30



USAGE PIE CHART AND %

HEATING 23 %
COOLING %
VENTILATION & INF 18 %
LIGHTING 27 %
MOTORS/PUMPS %
LOSSES 28 %
MISC 4 %
%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Kinoosao BUILDING School (Apisasin)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Foyer OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	Option#18 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Oil Fired Water Heater OTHERS	OTHERS
NUMBER OF UNITS			2		1				32	4	1	
SAVINGS PER UNIT $/Y			400						3.92	40		
TOTAL ENERGY SAVINGS $/Y			800		286				125	160	890	
COMBINED ENERGY SAVINGS $/Y	2261											
UNIT RETROFIT COST $			254						6.60	42		
TOTAL RETROFIT COST $			508		1770				211	168	1400	
COMBINED RETROFIT COST $	4057											
UNIT FUEL SAVING, L			747									
TOTAL FUEL SAVING, L			1494		726						-350	
COMBINED FUEL SAVINGS, L	1870											
UNIT ELECTRIC SAVING, KW			247						10	102		
TOTAL ELECTRIC SAVING, KW			494						320	404	2640	
COMBINED ELECTRIC SAVING, KW	3858											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	85.9											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	482											
PAYBACK PERIOD YRS			<1		5				2	1	1.6	

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 **AFTER**

275 GJ

100%

TOTAL

SAVINGS

86 GJ/YEAR

31 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 275 GJ
SUGGESTED ECM2 SAVINGS 86 GJ
FUTURE ANNUAL ENERGY TARGET 189 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 72,000 MJ = 1870 litres
GAS = MJ = m^3
ELEC = 13,900 MJ = 3858 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Power Plant (Diesel)

LOCATION Kinoosao
Sask
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Power Generation

CLASSIFICATION Institutional
OCCUPANCY TYPE None
OCCUPANCY AVERAGE -
AGE OF BUILDING 20 ?
LAST MAJOR RENOVATION DATES Periodically replaced with overhaul units

SIZE m2
BEPI (ACTUAL) na
BEPI (TARGET)

BUILDING CONTACT PERSON:
NAME North-Sask Electric Ltd
TITLE W.C. McLachlan Manager
PHONE 425-2019
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 2
DESCRIBE Front & Side

ENERGY AUDIT SURVEY DATA

DATE
SURVEY TYPE # None

SURVEY BY: COMPANY NAME
TEAM LEADER

DESCRIPTION 1-75 & 1-100 KW skid MTD Trailer units 10'X15' insulated armco building with engine cooling fan discharge interconnected with air plenum between units for space heating. No surplus heat for recovery, c̄ Generation at <20% efficiency. No retrofit other than electric clutch on cooling fan suggested.

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Kinoosao BUILDING SPC Power Plant (Diesel)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Electric Clutch Rad Fan OTHERS	OTHERS
NUMBER OF UNITS											2	
SAVINGS PER UNIT $/Y												
TOTAL ENERGY SAVINGS $/Y											4666 (2)	
COMBINED ENERGY SAVINGS $/Y	4666											
UNIT RETROFIT COST $											4500	
TOTAL RETROFIT COST $											9000	
COMBINED RETROFIT COST $	9000											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L											11,665	
COMBINED FUEL SAVINGS, L	11,665											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW												
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	449											
COMBINED UNIT ENERGY SAVING, (MJ/M2)												
PAYBACK PERIOD YRS											2	

(1) 40¢/L, one unit considered standby

(2) $0.7 \times \frac{3\text{ KW fan}}{75\text{ Kw} \times .3\text{LF}} \times 125{,}000\text{L/y} \times \$0.40\text{/L} = \$4666$

5. BUILDING SURVEY REPORT

BUILDING Teacherage
Northern Lights School Div.
LOCATION Kinoosao
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Residential
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 4
AGE OF BUILDING <10
LAST MAJOR RENOVATION DATES

SIZE 89 **m2**
BEPI (ACTUAL) 1943
BEPI (TARGET) 2022

BUILDING CONTACT PERSON:
NAME Willard Slippin
TITLE Principal
PHONE Jr 32907
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 4
DESCRIBE Front, back and sides

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Wood frame, wood sided, gable roof , Toronto split, wood heater on main floor would be better in basement then could heat entire house; home used for special classes, as school extension;HWH & lighting high. Use & like vinyl window film;need door weather stripping.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 101 GJ

ELEC 72

SOLAR GAIN ______

TOTALS 173 GJ

* Wood space heater used

ENERGY OUT

E.F.F. LOSSES 60 GJ

HEATING 46

COOLING ______

LIGHTING } 36

MOTORS }

HWH 36

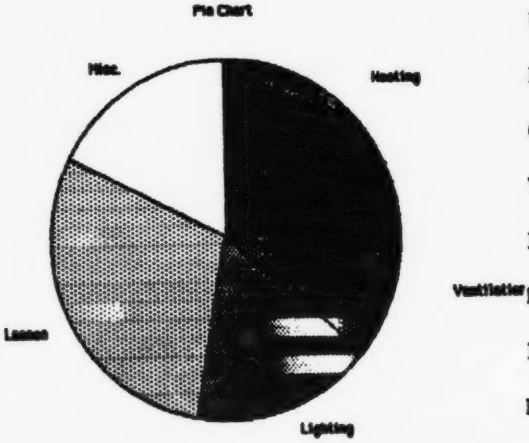
VENT & INF 28

TOTAL OUT 206 GJ*

TOTAL ENERGY CONSUMED 100% 173 GJ

WEATHER SENSITIVE PORTION OF ENERGY 65% 112 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY 35% 61 GJ



USAGE PIE CHART AND %

HEATING 23 %

COOLING ______ %

VENTILATION 13 %

LIGHTING 17 %

MOTORS/PUMPS ______ %

LOSSES 30 %

MISC, HWH 17 %

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Kinoosao BUILDING Teacherage

	WINDOWS VINYL FILM(1)	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	Option#18 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Oil HWH OTHERS	OTHERS
NUMBER OF UNITS	(14)	1	1							4		
SAVINGS PER UNIT $/Y	(31)									40		
TOTAL ENERGY SAVINGS $/Y	(434)	50	130							160	985	
COMBINED ENERGY SAVINGS $/Y	1325											
UNIT RETROFIT COST $										42		
TOTAL RETROFIT COST $		139	254							168	1400	
COMBINED RETROFIT COST $	1961											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L		123	290								(-1600)	(3)
COMBINED FUEL SAVINGS, L	-1187(3)											
UNIT ELECTRIC SAVING,KW										102		
TOTAL ELECTRIC SAVING,KW			90							408	10,220	(2)
COMBINED ELECTRIC SAVING,KW	10,718											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	-7(3)											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	-78											
PAYBACK PERIOD YRS		2.7								1	1.4	

(1) Presently being used, not included in total
(2) Very inefficient to use deiesel generated power for heating
(3) Net oil saving is 4800 used in power Gen -1600 used in HWH = 3200 L/y

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
173 GJ 100%		180 GJ
TOTAL		
58%		81%
101		146
OIL		OIL
42%		49%
72		34
Power	SAVINGS	Power

____________GJ/YEAR

____________%

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 173 GJ
SUGGESTED ECM2 SAVINGS -7 GJ
FUTURE ANNUAL ENERGY TARGET 180 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	-45,000	MJ =	-1187	litres
GAS =		MJ =		m3
ELEC =	38,000	MJ =	10,718	KWH
OTHERS		MJ =		
		MJ =		

Net reduction of 3600L/Y of fuel oil used in power generation.

5. BUILDING SURVEY REPORT

BUILDING School
Northern Lights School Div(113)
LOCATION Southend, Sask.

Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional 111
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 150
AGE OF BUILDING 4
LAST MAJOR RENOVATION DATES

SIZE 1520 **m2**
BEPI (ACTUAL) 779
BEPI (TARGET) 709

BUILDING CONTACT PERSON:
NAME John Collins
TITLE Principal
PHONE 758-2011
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 4
DESCRIBE · Front, back & Sides

ENERGY AUDIT SURVEY DATA

DATE Sept. 4/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE
TEAM LEADER POLLOCK

DESCRIPTION New high energy efficiency school, wood fired boilers attempted & abandoned in favor of propane fired pulse boilers, some technology problems with high wall-high insulation, internal circulation, R factor (Design) not realized. Mechanical has pneumatic controls, no apparent service contract. No apparent provision for straight recycle ventilation air, as mixed air controller set at 13 degrees C.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 770 GJ

ELEC 414

SOLAR GAIN

TOTALS 1184 GJ

ENERGY OUT

E.F.F. LOSSES 68 GJ

HEATING 333

COOLING Minor

LIGHTING 414

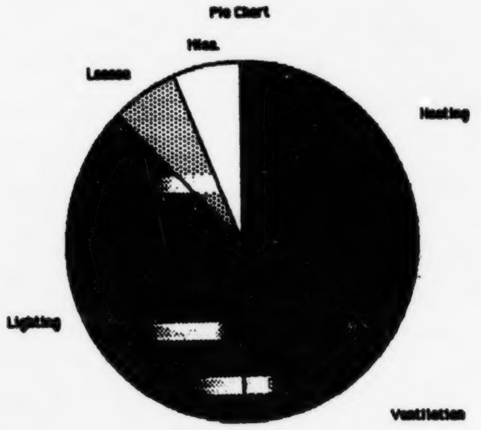
MOTORS

Ventilation 216+

Hot W. 67

TOTAL OUT 1098+ GJ

TOTAL ENERGY CONSUMED	100%	1098	GJ
WEATHER SENSITIVE PORTION OF ENERGY	56 %	617	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	44 %	481	GJ



USAGE PIE CHART AND %

HEATING 30 %

COOLING %

VENTILATION 20 %

LIGHTING 38 %

MOTORS/PUMPS %

LOSSES 6 %

MISC 6 %

%

COMMUNITY Southend

ENERGY CONSERVATION RETROFIT OPTIONS

BUILDING School-Northern Lights School Division

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS									385	17		
SAVINGS PER UNIT $/Y									3.92	40		
TOTAL ENERGY SAVINGS $/Y									1509	680		
COMBINED ENERGY SAVINGS $/Y	2189											
UNIT RETROFIT COST $									6.59	42.25		
TOTAL RETROFIT COST $									2537	718		
COMBINED RETROFIT COST $	3255											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L												
COMBINED FUEL SAVINGS, L												
UNIT ELECTRIC SAVING, KW									10	102		
TOTAL ELECTRIC SAVING, KW									3850	1734		
COMBINED ELECTRIC SAVING, KW	5584											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	20											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	13											
PAYBACK PERIOD YRS									1.7	1		

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

1098GJ 100% 1078GJ

TOTAL

SAVINGS

20 GJ/YEAR

2 %

% + GJ OF EACH ENERGY TYPE

1984-85 ANNUAL ENERGY CONSUMPTION 1098 GJ
SUGGESTED ECM2 SAVINGS 20 GJ
FUTURE ANNUAL ENERGY TARGET 1078 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = MJ = litres
GAS = MJ = m3
ELEC = 20,102 MJ = 5584 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Band School

LOCATION Southend, Saskatchewan

Fed Dept
EMR FILE #

BUILDING PRIMARY USE school

CLASSIFICATION	institutional
OCCUPANCY TYPE	C
OCCUPANCY AVERAGE	95+
AGE OF BUILDING	25
LAST MAJOR RENOVATION DATES	1972

SIZE 475 m2

BEPI (ACTUAL) 6200
BEPI (TARGET) 5340

BUILDING CONTACT PERSON:
NAME Gail Jobb
TITLE Principal
PHONE 758-2180
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 3
DESCRIBE front, back & Side

ENERGY AUDIT SURVEY DATA

DATE January 1985

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Sask Power Enersave
TEAM LEADER Pollock

DESCRIPTION See following page for details

Southend Band School Description

This is a two storey wood frame structure over concrete basement level. Heating system is oil fired HW Boiler with wall fin and convector radiation which presently has no effective working zone control, system is running wild. Exhaust system consists of two fans with normal switches in furnace room. Basement entry is direct from exterior doorway offering no effective air lock to the lower levels where classrooms are presently supplementary heated with electric heaters. The operating staff were not familiar with the exhaust system indicating the importance of a control and monitoring system for the equipment in the administrator's office. Because the building is old and in need of an architectural retrofit or replacement, treatment to the building envelope is not considered further.

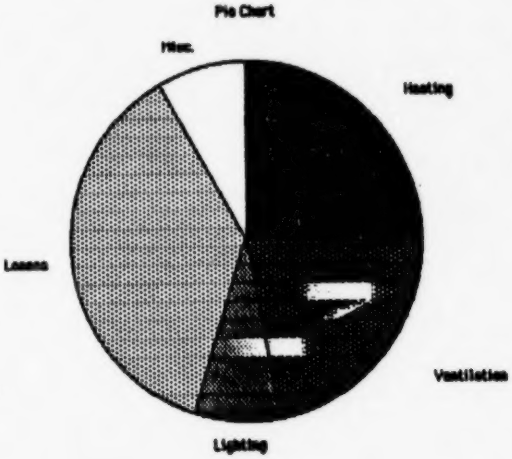
The identified retrofit measure with a potential short payback are shown in the following pages. The emphasis is on providing temperature control for efficient heat distribution.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	2730 GJ	E.F.F. LOSSES	1051 GJ
ELEC	213	HEATING	729
SOLAR GAIN		COOLING	
		LIGHTING	213
		MOTORS	
		HWH	45
TOTALS	2943 GJ (as Reported)	INF	180
		Vent	624
		TOTAL OUT	2842 GJ

TOTAL ENERGY CONSUMED	100%	2730	GJ
WEATHER SENSITIVE PORTION OF ENERGY	%	2442	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	%	288	GJ



USAGE PIE CHART AND %

HEATING	25 %
COOLING	%
VENTILATION	22 %
LIGHTING	8 %
MOTORS/PUMPS	%
LOSSES	37 %
MISC	8 %
	%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING Band School

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Zone Valves OTHERS	Exhaust Fans MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Force Flow OTHERS	OTHERS
NUMBER OF UNITS		4	10		10	6					2	
SAVINGS PER UNIT $/Y		100	See zone V		280	253					780	
TOTAL ENERGY SAVINGS $/Y		400			2800+	1518					1560	
COMBINED ENERGY SAVINGS $/Y	6278+											
UNIT RETROFIT COST $		139			556	367					610	
TOTAL RETROFIT COST $		556			5560	2200					1220	
COMBINED RETROFIT COST $	9536											
UNIT FUEL SAVING, L		246			716	298						
TOTAL FUEL SAVING, L		984			7160	1798						
COMBINED FUEL SAVINGS, L	9932											
UNIT ELECTRIC SAVING,KW						350					2562	
TOTAL ELECTRIC SAVING,KW						2100					5124	
COMBINED ELECTRIC SAVING,KW	7224											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	408											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	860											
PAYBACK PERIOD YRS		1.4			2	1.5					1	

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

2943 GJ 100%

TOTAL

SAVINGS

408 GJ/YEAR

14 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 2943 GJ
SUGGESTED ECM2 SAVINGS 408+ GJ
FUTURE ANNUAL ENERGY TARGET 2535 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	382,382	MJ =	9932	litres
GAS =		MJ =		m3
ELEC =	26,000	MJ =	408	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Kindergarden #1

LOCATION Southend, Sask.

Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institution
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 30
AGE OF BUILDING +10
LAST MAJOR RENOVATION DATES

SIZE 88.9 **m2**

BEPI (ACTUAL) 2384
BEPI (TARGET) 1609

BUILDING CONTACT PERSON:
NAME Gail Jobb
TITLE Principal
PHONE 758-2180
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 1
DESCRIBE · Front View

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Sask. Power & NRC HOT CAN
TEAM LEADER

DESCRIPTION Single story wood frame & sided gable roof building with insulated floor and unheated crawl space. Window boarded over. Oil fired heating, building fair-poor condition. Recommend retrofit temperature set back, attic insulation, econo watt lamps.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 194 GJ

ELEC 18

SOLAR GAIN

TOTALS 212 GJ

ENERGY OUT

E.F.F. LOSSES 46 GJ

HEATING 57 CALC

COOLING

LIGHTING 13

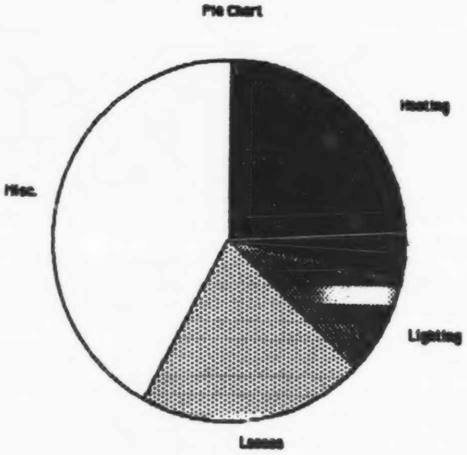
MOTORS 4

HWH 33

UNACC'T (59)

TOTAL OUT 153 GJ

TOTAL ENERGY CONSUMED	100%	212	GJ
WEATHER SENSITIVE PORTION OF ENERGY	77%	163	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	23%	50	GJ



USAGE PIE CHART AND %

HEATING 28 %

COOLING %

VENTILATION %

LIGHTING 7 %

MOTORS/PUMPS 2 %

LOSSES 21 %

MISC 27 %

HWH 15 %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING KINDERGARDEN 2

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS			1	84					36			
SAVINGS PER UNIT $/Y				3.45					3.92			
TOTAL ENERGY SAVINGS $/Y			464	289					141			
COMBINED ENERGY SAVINGS $/Y	894											
UNIT RETROFIT COST $				17.30					6.59			
TOTAL RETROFIT COST $			254	1453					237			
COMBINED RETROFIT COST $	1944											
UNIT FUEL SAVING, L				8.4								
TOTAL FUEL SAVING, L			1046	705								
COMBINED FUEL SAVINGS, L	1751											
UNIT ELECTRIC SAVING,KW									10			
TOTAL ELECTRIC SAVING,KW			87						360			
COMBINED ELECTRIC SAVING,KW	447											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	69											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	821											
PAYBACK PERIOD YRS												

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
212 GJ	100%		143 GJ
TOTAL			

SAVINGS

69 GJ/YEAR

32 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 212 GJ
SUGGESTED ECM2 SAVINGS 69 GJ
FUTURE ANNUAL ENERGY TARGET 143 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	67,400	MJ =	1751	litres
GAS =		MJ =		m3
ELEC =	1,609	MJ =	447	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Kindergarden #2 Portable

LOCATION Southend , Sask.

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institution

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 30

AGE OF BUILDING 2

LAST MAJOR RENOVATION DATES

SIZE 75.4 **m2**

BEPI (ACTUAL) Calc 1843

BEPI (TARGET) 1282

BUILDING CONTACT PERSON:

NAME Gail Jobb

TITLE Principal

PHONE 758-2180

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 2

DESCRIBE Front & Side

ENERGY AUDIT SURVEY DATA

DATE Jan/85

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Single story double unit portable wood frame metal clad, insulated floor crawl space, propane fire furnace. Fairly new building, retrofit recommendations temp. set back & econo-watt lamps.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 117 GJ

ELEC 22

SOLAR GAIN ____

____ ____

____ ____

____ ____

TOTALS 139 GJ

ENERGY OUT

E.F.F. LOSSES 37 GJ

HEATING 47

COOLING ____

LIGHTING 18

MOTORS 4

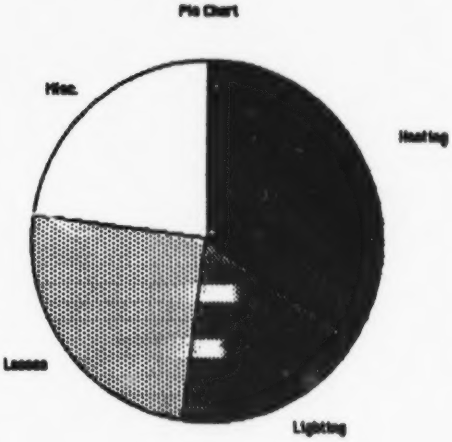
HWH 33

____

____

TOTAL OUT 139 GJ

TOTAL ENERGY CONSUMED	100%	139	GJ
WEATHER SENSITIVE PORTION OF ENERGY	60 %	84	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	40 %	55	GJ



USAGE PIE CHART AND %

HEATING 35 %

COOLING ____ %

VENTILATION ____ %

LIGHTING 13 %

MOTORS/PUMPS 3 %

LOSSES 26 %

MISC 23 %

____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY SOUTHEND BUILDING KINDERGARDEN 2 PORTABLE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS			1						48			
SAVINGS PER UNIT $/Y									3.92			
TOTAL ENERGY SAVINGS $/Y			464						188			
COMBINED ENERGY SAVINGS $/Y	652											
UNIT RETROFIT COST $									6.59			
TOTAL RETROFIT COST $			254						316			
COMBINED RETROFIT COST $	570											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L			1046									
COMBINED FUEL SAVINGS, L	1046											
UNIT ELECTRIC SAVING, KW									10			
TOTAL ELECTRIC SAVING, KW			87						480			
COMBINED ELECTRIC SAVING, KW	567											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	42											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	561											
PAYBACK PERIOD YRS												

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
139 GJ	100%		97 GJ

TOTAL

SAVINGS

42 GJ/YEAR

30 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 139 GJ
SUGGESTED ECM2 SAVINGS 42 GJ
FUTURE ANNUAL ENERGY TARGET 97 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = ______ MJ = ______ litres
GAS = ______ MJ = ______ m3
ELEC = 2041 MJ = 567 KWH
OTHERS 40,271 MJ = 1579 L propane
______ MJ = ______

5. BUILDING SURVEY REPORT

BUILDING Band Hall (Community)

LOCATION Southend

Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE Assembly, presently not in use
CLASSIFICATION 111
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 50 ?
AGE OF BUILDING 25
LAST MAJOR RENOVATION DATES

SIZE 293 **m2**
BEPI (ACTUAL) 1081 (Temp set
BEPI (TARGET) back unknown)

BUILDING CONTACT PERSON:
NAME Leo Jobb
TITLE Band Administrator
PHONE 758-2180
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 3
DESCRIBE Front, back & side

ENERGY AUDIT SURVEY DATA

DATE Sept 7/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE
TEAM LEADER POLLOCK

DESCRIPTION Wood frame & sided single story structure with crawl space. Need total upgrading, interior & exterior. Interior upgrading & vestibule extension given for consideration,building not heated in 84/85 year, CALC. saving based on continually heated building.

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING BAND HALL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Interior Furring Inside OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	New light fixtures OTHERS	Vest-ibul OTHERS
NUMBER OF UNITS			3	293	326						27	1
SAVINGS PER UNIT $/Y			232	3.45	2.96						31	
TOTAL ENERGY SAVINGS $/Y				1010	964						837	286
COMBINED ENERGY SAVINGS $/Y	3097											
UNIT RETROFIT COST $			254	17.30	42.75						88	
TOTAL RETROFIT COST $			762	5068	13,936						2376	1770
COMBINED RETROFIT COST $	23,912											
UNIT FUEL SAVING, L			523	8.40	7.23							
TOTAL FUEL SAVING, L				2461	2356							726
COMBINED FUEL SAVINGS, L	5543											
UNIT ELECTRIC SAVING,KW			43								80	
TOTAL ELECTRIC SAVING,KW											2160	
COMBINED ELECTRIC SAVING,KW	2160											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	220											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	750											
PAYBACK PERIOD YRS			1	5							3	5.9

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

100%

TOTAL

SAVINGS

220 GJ/YEAR

_____ %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION _____ GJ
SUGGESTED ECM2 SAVINGS 220 GJ
FUTURE ANNUAL ENERGY TARGET _____ GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 213,000 MJ = 5543 litres
GAS = _____ MJ = _____ m3
ELEC = 7,000 MJ = 2160 KWH
OTHERS _____ MJ = _____
_____ MJ = _____

5. BUILDING SURVEY REPORT

BUILDING Sask Tel

LOCATION Southend

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Equipment Building & Service Man. Residence

CLASSIFICATION 111

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 1

AGE OF BUILDING 9 Years

LAST MAJOR RENOVATION DATES

SIZE 36 m2

BEPI (ACTUAL) 1300

BEPI (TARGET) 905

BUILDING CONTACT PERSON:

NAME E. Splett P. Eng

TITLE Section Manager-BLDG & Towers

PHONE Sask Tel 347-2066

PHOTOGRAPHS AVAILABLE YES X NO

NUMBER 2

DESCRIBE · Front & Back

ENERGY AUDIT SURVEY DATA

DATE Jan

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Sask Tel STD ATCO type casual residence/equipment bldg. High reliability no maintenance heating required. Being elec. heated bldg, should be insulated to R30+ & Temp set back should be used. Doors & windows should also be included in modifications as shown.

ENERGY BALANCE USAGE

BALANCE

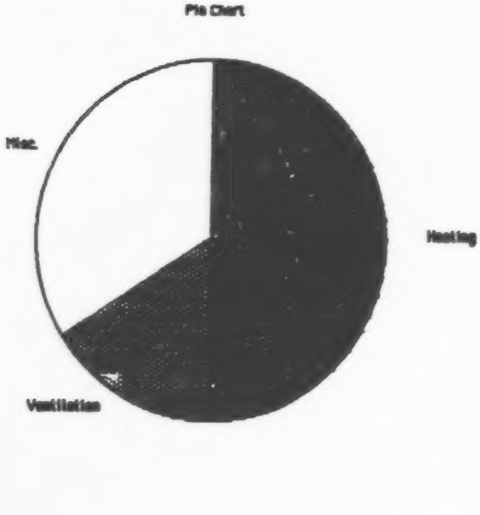
ENERGY IN

FUELS ____ GJ
ELEC 46.8
SOLAR GAIN ____
____ ____
____ ____
____ ____
TOTALS 46.8 GJ

ENERGY OUT

E.F.F. LOSSES ____ GJ
HEATING 23
COOLING 7.3
LIGHTING ____
MOTORS ____
EQUIP. 15.7
____
____
TOTAL OUT 46.8 GJ

TOTAL ENERGY CONSUMED 100% 46.8 GJ
WEATHER SENSITIVE PORTION OF ENERGY 65 % 30.3 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY 35 % 16.5 GJ



USAGE PIE CHART AND %

HEATING 50 %
COOLING } 16 %
VENTILATION } %
LIGHTING ____ %
MOTORS/PUMPS ____ %
LOSSES ____ %
MISC 34 %
____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING SASK TEL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	R30+ Exterior Ins. OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Exterior S. Door OTHERS	3rd Windows OTHERS
NUMBER OF UNITS					100						1	2
SAVINGS PER UNIT $/Y					7.31							335
TOTAL ENERGY SAVINGS $/Y					731						126	670
COMBINED ENERGY SAVINGS $/Y	1526											
UNIT RETROFIT COST $					64							500
TOTAL RETROFIT COST $					6400						550	1000
COMBINED RETROFIT COST $	7950											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L												
COMBINED FUEL SAVINGS, L												
UNIT ELECTRIC SAVING, KW					18.7							854
TOTAL ELECTRIC SAVING, KW					1870						323	1708
COMBINED ELECTRIC SAVING, KW	3901											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	14											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	389											
PAYBACK PERIOD YRS					8						4.3	1.5

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

46.6 GJ 100% 32.6 GJ

TOTAL

SAVINGS

14 GJ/YEAR

30 %

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 46.6 GJ
SUGGESTED ECM2 SAVINGS 14.0 GJ
FUTURE ANNUAL ENERGY TARGET 32.6 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = MJ = litres
GAS = MJ = m3
ELEC = 14,000 MJ = 3901 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Band School Teacherage #3
LOCATION Southend, Sask.
Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Institution
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 6
AGE OF BUILDING 25
LAST MAJOR RENOVATION DATES

SIZE 226 **m2**
BEPI (ACTUAL) 969 ?
BEPI (TARGET) 615

BUILDING CONTACT PERSON:
NAME Gail Jobb
TITLE Principal
PHONE 758-2180
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 1
DESCRIBE Front

ENERGY AUDIT SURVEY DATA

DATE 1982
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN
TEAM LEADER

DESCRIPTION Single story, wood frame, ac sided gable roof buidling in view of upgrading contemplated, only low cost retrofit indentified, i.e. weather stripping, temp. set back 3 degrees C, vinyl window film.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 156 GJ

ELEC 63

SOLAR GAIN ______

____ ______

____ ______

____ ______

TOTALS 219 GJ

ENERGY OUT

E.F.F. LOSSES 62 GJ

HEATING 94

COOLING ______

LIGHTING 63

MOTORS ______

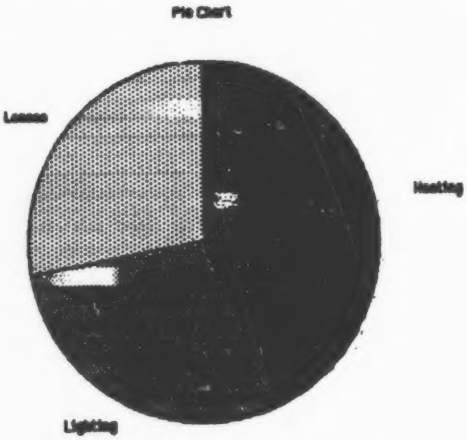
______

______

______

TOTAL OUT 219 GJ

TOTAL ENERGY CONSUMED	100%	219	GJ
WEATHER SENSITIVE PORTION OF ENERGY	71 %	156	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	29 %	63	GJ



USAGE PIE CHART AND %

HEATING 43 %

COOLING ______ %

VENTILATION ______ %

LIGHTING 29 %

MOTORS/PUMPS ______ %

LOSSES 28 %

MISC ______ %

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING BAND SCHOOL TEACHERAGE TRIPLEX

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	20	6	3									
SAVINGS PER UNIT $/Y	22.03 (1)	50	37 (2)									
TOTAL ENERGY SAVINGS $/Y	440	300	111									
COMBINED ENERGY SAVINGS $/Y	854											
UNIT RETROFIT COST $	9.20	139	254									
TOTAL RETROFIT COST $	184	834	762									
COMBINED RETROFIT COST $	1780											
UNIT FUEL SAVING, L	54	123	94									
TOTAL FUEL SAVING, L	1080	738	282									
COMBINED FUEL SAVINGS, L	2100											
UNIT ELECTRIC SAVING, KW			Minor									
TOTAL ELECTRIC SAVING, KW												
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	80											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	357											
PAYBACK PERIOD YRS	<1	2.7	7									

(1) 50% Non venting
(2) 7.5% saving for night time set back

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

219 GJ 100%

TOTAL

SAVINGS

90 GJ/YEAR

41 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 219 GJ
SUGGESTED ECM2 SAVINGS 80 GJ
FUTURE ANNUAL ENERGY TARGET 139 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 80,800 MJ = 2100 litres
GAS = MJ = m3
ELEC = MJ = Minor KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Band Duplex Teacherage #2

LOCATION Southend
Sask

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION V

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 6

AGE OF BUILDING 25

LAST MAJOR RENOVATION DATES ?

SIZE 175 **m2**

BEPI (ACTUAL) 2685

BEPI (TARGET) 1314

BUILDING CONTACT PERSON:

NAME Gail Jobb

TITLE Principal

PHONE 758-2180

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 2

DESCRIBE: Front & back exterior

ENERGY AUDIT SURVEY DATA

DATE 1982

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC HOT CAN

TEAM LEADER

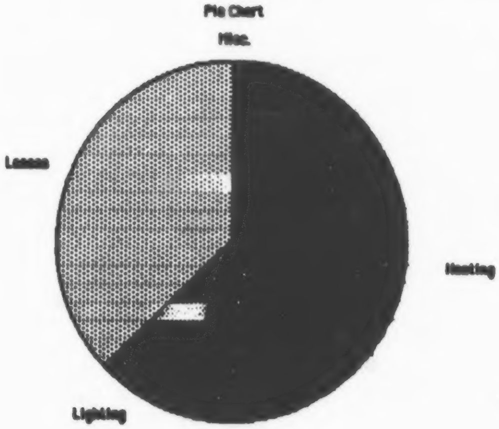
DESCRIPTION Old building needs renovation or replacement, if renovated basement & attic should be insulated & up grade, set back stats & vinyl seal also recommended.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	433 GJ	E.F.F. LOSSES	173 GJ
ELEC	37	HEATING	260
SOLAR GAIN		COOLING	
		LIGHTING	37
		MOTORS	Minor
TOTALS	470 GJ		
		TOTAL OUT	470 GJ CALC.

TOTAL ENERGY CONSUMED 100% 470 GJ CALC.
WEATHER SENSITIVE PORTION OF ENERGY 92% 433 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY 8% 37 GJ



USAGE PIE CHART AND %

HEATING 55 %
COOLING %
VENTILATION %
LIGHTING 8 %
MOTORS/PUMPS %
LOSSES 37 %
MISC %
%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING BAND DUPLEX TEACHERAGE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Basement Ins. OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	127	4	2	175	71							
SAVINGS PER UNIT $/Y	22.03 (1)	50	37 (2)	3.45	20							
TOTAL ENERGY SAVINGS $/Y	279	200	74	603	1420							
COMBINED ENERGY SAVINGS $/Y	2576											
UNIT RETROFIT COST $	9.20	139	254	17.30	42.75							
TOTAL RETROFIT COST $	116	556	508	3027	6156 (3)							
COMBINED RETROFIT COST $	10.363											
UNIT FUEL SAVING, L	54	123	94	8.40	48							
TOTAL FUEL SAVING, L	685	492	188	1470	3408							
COMBINED FUEL SAVINGS, L	6243											
UNIT ELECTRIC SAVING,KW			Minor									
TOTAL ELECTRIC SAVING,KW												
COMBINED ELECTRIC SAVING,KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	240											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1373											
PAYBACK PERIOD YRS	1	2.78	6.8	5	2.4							

1) 50% non venting
2) 7.5%+saving for night set-back (estimate)
3) for entire wall (144M2-R12+)

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

470 100%

TOTAL

Oil 433
92%

Power 37
8%

Oil
193
84%

Power 37
16%

SAVINGS

240 GJ/YEAR

51 %

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 470 GJ CALC
SUGGESTED ECM2 SAVINGS 240 GJ
FUTURE ANNUAL ENERGY TARGET 230 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 230,000 MJ = 5974 litres
GAS = MJ = m3
ELEC = MJ = KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Band Office

LOCATION Southend
Sask.

Fed Dept Peter Ballantyne Band

EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institution
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 2
AGE OF BUILDING 35 ?
LAST MAJOR RENOVATION DATES

SIZE 111 **m2**

BEPI (ACTUAL) 2063
BEPI (TARGET) 1513

BUILDING CONTACT PERSON:
NAME Leo Jobb
TITLE Administrator
PHONE 758-2180
PHOTOGRAPHS AVAILABLE YES y **NO**
NUMBER 2
DESCRIBE Front & back

ENERGY AUDIT SURVEY DATA

DATE Sept 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE
TEAM LEADER POLLOCK

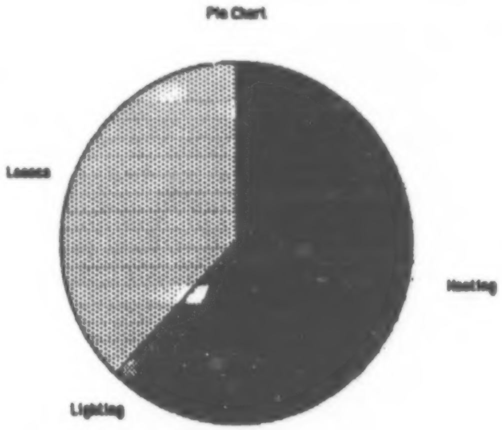
DESCRIPTION Single story log building with crawl space & gable roof: windows boarded over, retrofit, suggest insulated window panels, caulk air leaks, & temp. set back stat.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN			**ENERGY OUT**		
FUELS	222	GJ	E.F.F. LOSSES	88	GJ
ELEC	7		HEATING	133	
SOLAR GAIN			COOLING		
			LIGHTING	7	
			MOTORS		
TOTALS	229	GJ			
			TOTAL OUT	229	GJ

TOTAL ENERGY CONSUMED	100%	229	GJ
WEATHER SENSITIVE PORTION OF ENERGY	96 %	222	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	4 %	7	GJ



USAGE PIE CHART AND %

HEATING 58 %

COOLING %

VENTILATION %

LIGHTING 4 %

MOTORS/PUMPS %

LOSSES 38 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING BAND OFFICE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Insulated windows area & caulking OTHERS	OTHERS
NUMBER OF UNITS			1									
SAVINGS PER UNIT $/Y											10%	
TOTAL ENERGY SAVINGS $/Y			430								226	
COMBINED ENERGY SAVINGS $/Y	656											
UNIT RETROFIT COST $												
TOTAL RETROFIT COST $			254								500	
COMBINED RETROFIT COST $	754											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L			1046								557	
COMBINED FUEL SAVINGS, L	1603											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			87									
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	61											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	549											
PAYBACK PERIOD YRS			1								2	

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
229 GJ	100%		168 GJ

TOTAL

SAVINGS

61 GJ/YEAR

27 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 229 GJ
SUGGESTED ECM2 SAVINGS 61 GJ
FUTURE ANNUAL ENERGY TARGET 168 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	61,000	MJ =	1603	litres
GAS =		MJ =		m3
ELEC =	313	MJ =	87	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING PRR OFFICE & W'HSE

LOCATION Southend

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Office Warehouse

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 2

AGE OF BUILDING 20

LAST MAJOR RENOVATION DATES 1984

SIZE 177 m2

BEPI (ACTUAL) 1474 (heating only)

BEPI (TARGET) 842

BUILDING CONTACT PERSON:

NAME Kerry Wisser

TITLE Conservation officer

PHONE 758-2177

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 2

DESCRIBE Front & back

ENERGY AUDIT SURVEY DATA

DATE Sept 7/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Sask Power Enersave

TEAM LEADER Pollock

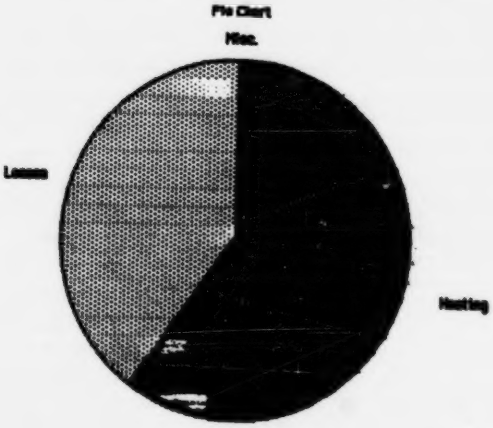
DESCRIPTION Undergoing renovations, good condition, fair insulation could use attic insulation, set back stat, weather stripping & vinyl window seal as shown herein. Exterior walls could be easily upgraded with more insulation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	260 GJ	E.F.F. LOSSES	104 GJ
ELEC	?	HEATING	156
SOLAR GAIN		COOLING	
		LIGHTING	
		MOTORS	
TOTALS	GJ		
		TOTAL OUT	260 GJ

TOTAL ENERGY CONSUMED	100%	GJ
WEATHER SENSITIVE PORTION OF ENERGY	%	260 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	%	GJ



USAGE PIE CHART AND %

HEATING 60 %

COOLING %

VENTILATION %

LIGHTING %

MOTORS/PUMPS %

LOSSES 40 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING PRR

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Yard lite HPS replace MV OTHERS	OTHERS
NUMBER OF UNITS	3.5	1	1	177							1	
SAVINGS PER UNIT $/Y	31.16			3.45								
TOTAL ENERGY SAVINGS $/Y	109	50	464	610							57	
COMBINED ENERGY SAVINGS $/Y	1290											
UNIT RETROFIT COST $	9.20			17.30								
TOTAL RETROFIT COST $	32.20	140	254	3062							43	
COMBINED RETROFIT COST $	3531											
UNIT FUEL SAVING, L	75			8.40								
TOTAL FUEL SAVING, L	262	123	1046	1486								
COMBINED FUEL SAVINGS, L	2917											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			87								146	
COMBINED ELECTRIC SAVING, KW	233											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	112											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	632											
PAYBACK PERIOD YRS	< 1	2.8	< 1	5							1	

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
260 GJ	100%		148
TOTAL			

SAVINGS

112 GJ/YEAR

43 %

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 260 GJ
SUGGESTED ECM2 SAVINGS 112 GJ
FUTURE ANNUAL ENERGY TARGET 148 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	112,000	MJ =	2917	litres
GAS =		MJ =		m3
ELEC =	313	MJ =	87	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Recreation Centre

LOCATION Southend , Sask.

Fed Dept Band

EMR FILE #

BUILDING PRIMARY USE Skating Rink

CLASSIFICATION Institution

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 40

AGE OF BUILDING 5

LAST MAJOR RENOVATION DATES

SIZE 150 m2
Heated area,1615 Gross

BEPI (ACTUAL) 231 On gross area

BEPI (TARGET) 202

BUILDING CONTACT PERSON:

NAME Leo Jobb

TITLE Administrator

PHONE 758-2180

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 2

DESCRIBE- Front & side

ENERGY AUDIT SURVEY DATA

DATE Aug 1984

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE

TEAM LEADER POLLOCK

DESCRIPTION New rink, change room area heated. Lights only on during occupancy. Rigid frame steel building with wood frame & side,slab on grad. attached building change room area Retrofit suggested econo-lamps in change rooms,temp set back, & 50% rink lamps changed to HPS.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 280 GJ

ELEC 93

SOLAR GAIN

TOTALS 373 GJ

ENERGY OUT

E.F.F. LOSSES 112 GJ

HEATING 148 CALC

COOLING

LIGHTING 93

MOTORS

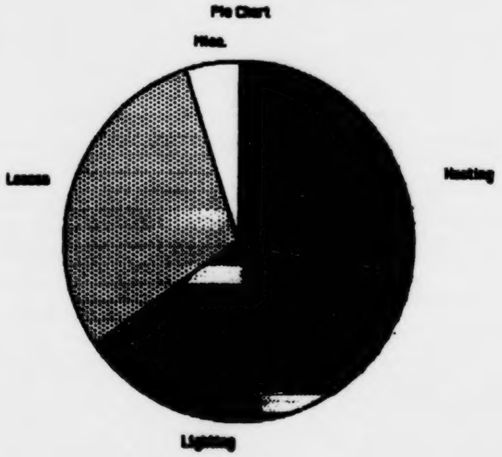
HWH 20

TOTAL OUT 373 GJ CALC

TOTAL ENERGY CONSUMED 100% 373 GJ

WEATHER SENSITIVE PORTION OF ENERGY 100 % 373 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % GJ



USAGE PIE CHART AND %

HEATING 40 %

COOLING %

VENTILATION %

LIGHTING 25 %

MOTORS/PUMPS %

LOSSES 30 %

MISC 5 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING RECREATION CENTRE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Half MV lamps to HPS OTHERS	OTHERS
NUMBER OF UNITS			1						17		16	
SAVINGS PER UNIT $/Y									3.92		36	
TOTAL ENERGY SAVINGS $/Y			430						66		576	
COMBINED ENERGY SAVINGS $/Y	1072											
UNIT RETROFIT COST $									3.30		53	
TOTAL RETROFIT COST $			254						56		848	
COMBINED RETROFIT COST $	1158											
UNIT FUEL SAVING, L												
TOTAL FUEL SAVING, L			1046									
COMBINED FUEL SAVINGS, L	1046											
UNIT ELECTRIC SAVING,KW									10		92	
TOTAL ELECTRIC SAVING,KW			87						170		1472	
COMBINED ELECTRIC SAVING,KW	1730											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	46.5											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	28.9											
PAYBACK PERIOD YRS			1						1		1.5	

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
326 GJ	100%		326 MJ
	TOTAL		

SAVINGS

46 GJ/YEAR

14 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 373 GJ
SUGGESTED ECM2 SAVINGS 46.5 GJ
FUTURE ANNUAL ENERGY TARGET 326 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	40,200	MJ =	1046	litres
GAS =		MJ =		m3
ELEC =	6228	MJ =	1730	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Health Clinic

LOCATION Southend , Sask.

Fed Dept H & W Can.
EMR FILE #

BUILDING PRIMARY USE Health Clinic & Residence

CLASSIFICATION Institution
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 5
AGE OF BUILDING 25 ?
LAST MAJOR RENOVATION DATES

SIZE 214 m2
BEPI (ACTUAL) 4439
BEPI (TARGET) 4042

BUILDING CONTACT PERSON:
NAME Mrs. Miller
TITLE Nurse
PHONE 758-2102
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 4
DESCRIBE · 4 sides of Building.

ENERGY AUDIT SURVEY DATA

DATE Aug 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE
TEAM LEADER POLLOCK

DESCRIPTION Two interconnected trailer units. Metal clad wood frame with crawl space, due for replacement shortly therefore minor retrofits considered. Recommendations temp set back 3 degrees C. weather stripping & vinyl window film.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 857 GJ

ELEC 93

SOLAR GAIN

TOTALS 950 GJ

ENERGY OUT

E.F.F. LOSSES 342 GJ

HEATING 514

COOLING

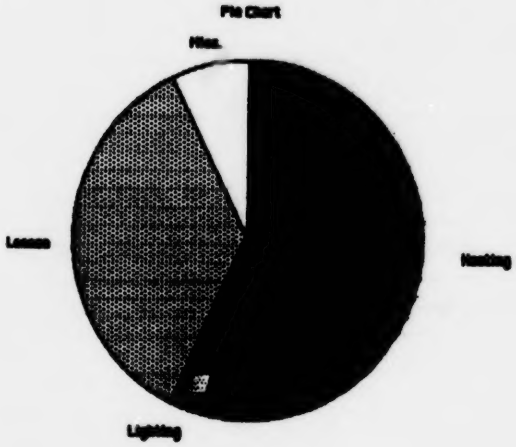
LIGHTING } 21

MOTORS

OTHERS 72

TOTAL OUT 950 GJ

TOTAL ENERGY CONSUMED	100%	950	GJ
WEATHER SENSITIVE PORTION OF ENERGY	90 %	857	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	10 %	93	GJ



USAGE PIE CHART AND %

HEATING 54 %

COOLING %

VENTILATION %

LIGHTING 3 %

MOTORS/PUMPS %

LOSSES 36 %

MISC 7 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend . BUILDING HEALTH CLINIC

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT 3°C	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	18	2	1							12		
SAVINGS PER UNIT $/Y	31.16	50								40		
TOTAL ENERGY SAVINGS $/Y	560	100	232							480		
COMBINED ENERGY SAVINGS $/Y	1372											
UNIT RETROFIT COST $	9.20	140								42		
TOTAL RETROFIT COST $	165	280	254							504		
COMBINED RETROFIT COST $	1203											
UNIT FUEL SAVING, L	75	123										
TOTAL FUEL SAVING, L	1350	246	523									
COMBINED FUEL SAVINGS, L	2119											
UNIT ELECTRIC SAVING,KW										102		
TOTAL ELECTRIC SAVING,KW			44							1224		
COMBINED ELECTRIC SAVING,KW	1268											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	85.5											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	400											
PAYBACK PERIOD YRS	<1	2.7	1									

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
950 GJ	100%		865 MJ
	TOTAL		

SAVINGS

85 GJ/YEAR

9 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 950 GJ
SUGGESTED ECM2 SAVINGS 85+ GJ
FUTURE ANNUAL ENERGY TARGET 865 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	81,500	MJ =	2119	litres
GAS =		MJ =		m3
ELEC =	4560	MJ =	1268	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING NH OFFICE

LOCATION Southend Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 4

AGE OF BUILDING 15

LAST MAJOR RENOVATION DATES

SIZE 48 m2

BEPI (ACTUAL) 8208

BEPI (TARGET) 5687

BUILDING CONTACT PERSON:

NAME Bella Cook

TITLE Secretary

PHONE 758-2044

PHOTOGRAPHS AVAILABLE YES X NO

NUMBER 1

DESCRIBE Front

ENERGY AUDIT SURVEY DATA

DATE Sept 7/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC ENERSAVE

TEAM LEADER POLLOCK

DESCRIPTION ATCO skid MTD trailer office, almost new. Retrofit measures identified, slab edge insulation, weather stripping doors & vinyl window seal. Vestibual would improve comfort conditions, but not cost effective

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 380 GJ

ELEC 14

SOLAR GAIN ______

______ ______

______ ______

______ ______

TOTALS 394 GJ

ENERGY OUT

E.F.F. LOSSES 152 GJ

HEATING 228

COOLING ______

LIGHTING 14

MOTORS INC.

______

______

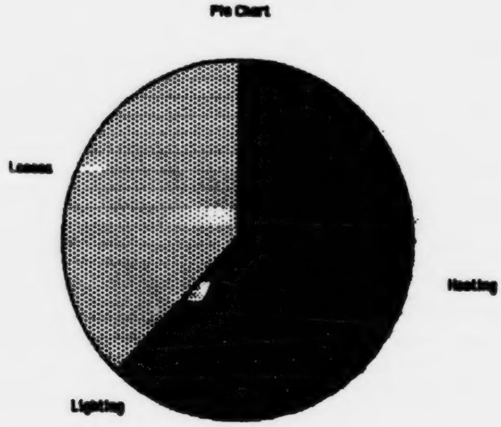
______

TOTAL OUT 394 GJ

TOTAL ENERGY CONSUMED 100% 394 GJ

WEATHER SENSITIVE PORTION OF ENERGY 96% 380 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % 14 GJ



USAGE PIE CHART AND %

HEATING 58 %

COOLING ______ %

VENTILATION ______ %

LIGHTING 4 %

MOTORS/PUMPS ______ %

LOSSES 38 %

MISC ______ %

______ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING NH OFFICE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Slab Edge Insul. OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Vestibule OTHERS	OTHERS
NUMBER OF UNITS	8.6	1	1		23						(1)	
SAVINGS PER UNIT $/Y	31				51						(286)	
TOTAL ENERGY SAVINGS $/Y	266	50	464		1173							
COMBINED ENERGY SAVINGS $/Y	1953											
UNIT RETROFIT COST $	9.20				64						(1770)	
TOTAL RETROFIT COST $	79	140	254		1472							
COMBINED RETROFIT COST $	1945											
UNIT FUEL SAVING, L	75				58							
TOTAL FUEL SAVING, L	645	123	1046		1334							
COMBINED FUEL SAVINGS, L	3148											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW			87									
COMBINED ELECTRIC SAVING,KW	87											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	121											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	2520											
PAYBACK PERIOD YRS	1	2.8	<1		1.2							

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
394 GJ 100%		273

TOTAL

SAVINGS

121 GJ/YEAR

30 %

% + GJ OF EACH ENERGY TYPE

19 83-84 ANNUAL ENERGY CONSUMPTION 394 GJ
SUGGESTED ECM2 SAVINGS 121 GJ
FUTURE ANNUAL ENERGY TARGET 273 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 121,000 MJ = 3148 litres
GAS = MJ = m3
ELEC = 313 MJ = 87 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING NH Hall

LOCATION Southend,
Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Assembly

CLASSIFICATION Institutional

OCCUPANCY TYPE 2-3 HRS/day

OCCUPANCY AVERAGE 10 - 20 persons

AGE OF BUILDING

LAST MAJOR RENOVATION DATES

SIZE 131 m2

BEPI (ACTUAL) 679

BEPI (TARGET) 534

BUILDING CONTACT PERSON:

NAME Bella Cook

TITLE Secretary

PHONE 758-2044

PHOTOGRAPHS AVAILABLE YES X NO

NUMBER 2

DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE Jan 85

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

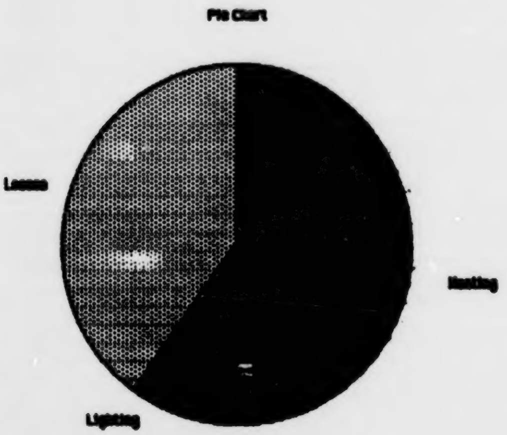
DESCRIPTION Wood frame & sheathed building. Gable roof, no crawl space, poor condition; heated only when in use 2-3 hrs/day. Could upgrade with exterior insulation & siding, attic insulation & door weather stripping. Cold starts limit choice of lighting to essentually Inc. unless greater use is made of building. Repair walls & weather stripping.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	86 GJ	E.F.F. LOSSES	34 GJ
ELEC	3	HEATING	51
SOLAR GAIN		COOLING	
		LIGHTING } MOTORS	3
TOTALS	89 GJ		
		TOTAL OUT	89 GJ

TOTAL ENERGY CONSUMED	100%	89 GJ
WEATHER SENSITIVE PORTION OF ENERGY	96 %	86 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	4 %	3 GJ



USAGE PIE CHART AND %

HEATING 57 %

COOLING %

VENTILATION %

LIGHTING } MOTORS/PUMPS 3 %

LOSSES 40 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Southend BUILDING NH HALL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Repair Walls OTHERS	OTHERS
NUMBER OF UNITS		1		(131)						(9)	10	
SAVINGS PER UNIT $/Y		18 (1)		(1.30)						63	18	
TOTAL ENERGY SAVINGS $/Y		18		(170) (2)						(567) (2)	180	
COMBINED ENERGY SAVINGS $/Y	198											
UNIT RETROFIT COST $				(17.30)						88	50	
TOTAL RETROFIT COST $		139		(2266) (2						(792) (2)	500	
COMBINED RETROFIT COST $	639											
UNIT FUEL SAVING, L											46	
TOTAL FUEL SAVING, L		46									460	
COMBINED FUEL SAVINGS, L	506											
UNIT ELECTRIC SAVING, KW										160		
TOTAL ELECTRIC SAVING, KW										(1440) (2)		
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	19											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	145											
PAYBACK PERIOD YRS	3										2.7	

(1) 3 HRS/day

(2) Not in totals, for information only

ENERGY SOURCES & TARGETS

BEFORE **IMPLEMENTATION OF ECM2** **AFTER**

89 GJ 100% 70 GJ

TOTAL

SAVINGS

19 GJ/YEAR

21 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 89 GJ
SUGGESTED ECM2 SAVINGS 19 GJ
FUTURE ANNUAL ENERGY TARGET 70 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 19.000 MJ = 506 litres
GAS = MJ = m3
ELEC = MJ = KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING SCHOOL
Northern Lights School Division
LOCATION Stony Rapids, Sask.

Fed Dept
EMR FILE #

BUILDING PRIMARY USE School

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE See SPC Audit
AGE OF BUILDING
LAST MAJOR RENOVATION DATES 1980 extension

SIZE 1369.4 **m2**
BEPI (ACTUAL) 3305
BEPI (TARGET) 2674

BUILDING CONTACT PERSON:
NAME Eric Hammlar
TITLE Principal
PHONE
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 9
DESCRIBE· Exterior Views

ENERGY AUDIT SURVEY DATA

DATE Aug. 27, 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Saskatchewan Power Corp.
TEAM LEADER Pollock

DESCRIPTION Single story double wye masonry wall, gable roof, part joist & part truss, crawl space, local clusters oil fired Hot air furnaces, some with outside air for mixed air supply. Relatively new building 3/4 heating under floor duct system, perimeter grade insulation 100 mm thermal short. Has eleven (11) exhaust fans, local switched furnaces,

Stony Rapids School Description

Manual dampered outside air supplies interconnected to furnace return air. Gym has return air fan with exhaust and mixed air control. Multiple furnaces operate in tandem or triplex and are reportedly protected from reverse air flow if one unit fails and the other continues to operate.

The system has a potential of exhausting upwards of 4.7 m^3/s with all exhaust fans operating. The potential for make up air with all outside air dampers open (0.76 m) is approximately equal to exhaust volumes. The outside air dampers were observed to be partially closed during the winter site inspection. Exhaust fans were being operated intermitantly. Furnace blowers were observed on continuous operation with burners cycling on thermostats. The minimum outside air requirements estimated for 100 students is approximately 0.5 m^3/s or approximately 1/10 the potential exhaust capacity of the system.

The potential natural infiltration into the building at less than one half air change per hour would satisfy this requirement except in high density class rooms. Welding and fume exhaust is provided in the shop area that reportedly is used more for fume control than welding.

This system has high energy utilization potential if outside air and exhaust systems are used indiscriminately of occupancy requirements. Heading the list of suggested retrofits for energy conservation is a control monitoring and control system for all furnace blower and auto damper outside air control, so that the administrator can select positive ventilation operation for high density occupancy and economy cyclic fan operation with no outside air for other areas during cold winter months. This control could be provided with three times a day (noon, 6:00 p.m. and 10:00 p.m.) auto reset to economy operation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 4148 GJ

ELEC 377

SOLAR GAIN

TOTALS 4525 GJ

ENERGY OUT

E.F.F. LOSSES 1651 GJ

HEATING 840

COOLING

LIGHTING }

MOTORS } 377

VENTILATION 1637

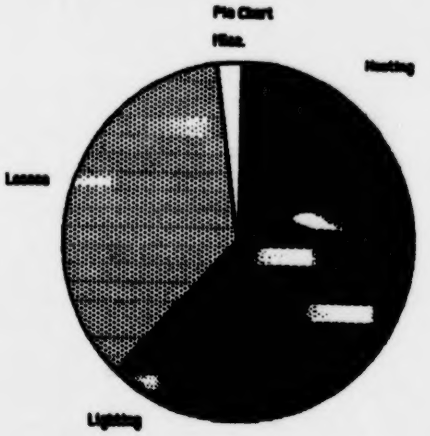
HWH 47

TOTAL OUT 4552 GJ

TOTAL ENERGY CONSUMED 100% 4525 GJ

WEATHER SENSITIVE PORTION OF ENERGY % 4101 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % 424 GJ



USAGE PIE CHART AND %

HEATING 18 %

COOLING %

VENTILATION 36 %

LIGHTING } 8 %

MOTORS/PUMPS } %

LOSSES 36 %

MISC 2 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING SCHOOL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	OP 14 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OP 22 OTHERS	OTHERS
NUMBER OF UNITS			8				8		496		11 (2)	
SAVINGS PER UNIT $/Y			400				911		3.92		(261)	
TOTAL ENERGY SAVINGS $/Y			3200				10,932(1)		1944			
COMBINED ENERGY SAVINGS $/Y	16,076											
UNIT RETROFIT COST $			254				1850		6.59		(286)	
TOTAL RETROFIT COST $			2032				14,800		3268			
COMBINED RETROFIT COST $	20,100											
UNIT FUEL SAVING, L			747				1221					
TOTAL FUEL SAVING, L			5976				14,650(1)					
COMBINED FUEL SAVINGS, L	20,626	794										
UNIT ELECTRIC SAVING, KW			247				1048		10		(730)	
TOTAL ELECTRIC SAVING, KW			1976				12,570 (1)		4960			
COMBINED ELECTRIC SAVING, KW	19,506	70										
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	864											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	631											
PAYBACK PERIOD YRS			1.0				2		1.7			

(1) 12 furnaces, one Tandem & one Quad.(2)Exterior lights, if on all night.

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
4525 GJ 100%		3661 GJ
TOTAL		
Oil 4148 Power 377		Oil 3354 Power 307

SAVINGS

864 GJ/YEAR

19 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 4525 GJ
SUGGESTED ECM2 SAVINGS 864 GJ
FUTURE ANNUAL ENERGY TARGET 3661 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 794,000 MJ = 20,626 litres
GAS = MJ = m3
ELEC = 70,000 MJ = 19,506 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Health Clinic
Sask Northern Health Services
LOCATION Stony Rapids
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Office -Clinic

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE See SPC Audit
AGE OF BUILDING 1980
LAST MAJOR RENOVATION DATES 1983

SIZE 337 m2
BEPI (ACTUAL) 2175
BEPI (TARGET) 1038

BUILDING CONTACT PERSON:
NAME Cathy Wright
TITLE Station Nurse
PHONE 439-2133
PHOTOGRAPHS AVAILABLE YES X NO
NUMBER 4
DESCRIBE Front - West End
North side, south side (two photos)

ENERGY AUDIT SURVEY DATA

DATE Jan 26/1984
SURVEY TYPE # 2

SURVEY BY: **COMPANY NAME** Sask. Power Corp (Enersave)
TEAM LEADER Pollock

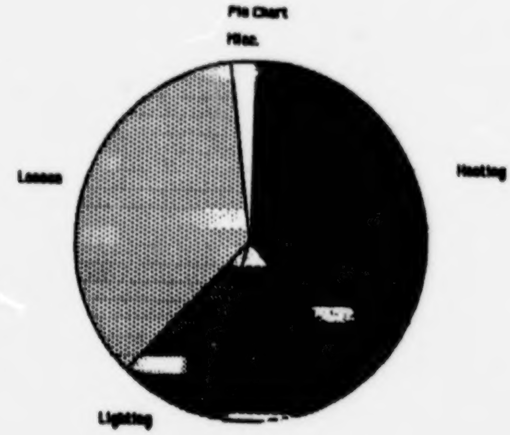
DESCRIPTION Story & half wood frames & side structure concrete sub walls, gable roof, oil fired warm (2) air furnaces, 4 windows replaced with alum sliders,other wood storm windows, two electric space heaters (entrance); retrofit recommendations,entrance vesibual, temperature set back stats, vinyl window film kits, weather strip doors.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN			ENERGY OUT		
FUELS	674	GJ	E.F.F. LOSSES	268	GJ
ELEC	59		HEATING	290	
SOLAR GAIN			COOLING		
			LIGHTING	59	
			MOTORS		
			VENT & INF	112	
TOTALS	733	GJ	HWH	10	
			TOTAL OUT	739	GJ

TOTAL ENERGY CONSUMED	100%	733	GJ
WEATHER SENSITIVE PORTION OF ENERGY	92 %	674	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	8 %	59	GJ



USAGE PIE CHART AND %

HEATING	39	%
COOLING		%
VENTILATION	15	%
LIGHTING	8	%
MOTORS/PUMPS		%
LOSSES	36	%
MISC	2	%
		%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING HEALTH CLINIC

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Vestibual OP9 OTHERS	MANUAL VENTILATION CONTROL	OP13 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OP 20 Exterior light OTHERS	OTHERS
NUMBER OF UNITS	41	2	2 (1)	337	1		2		20+		1	
SAVINGS PER UNIT $/Y	31	50	130	3.45			502		3.92			
TOTAL ENERGY SAVINGS $/Y	1271	100	260	1162	286		1004		78		84	
COMBINED ENERGY SAVINGS $/Y	4245											
UNIT RETROFIT COST $	9.20	140	254	17.30			1520		6.59			
TOTAL RETROFIT COST $	377	280	508	5830	1770		3040		131		261	
COMBINED RETROFIT COST $	12,197											
UNIT FUEL SAVING, L	75	123	290	8.40			1221					
TOTAL FUEL SAVING, L	3075	246	580	2830	726		2442					
COMBINED FUEL SAVINGS, L	9899											
UNIT ELECTRIC SAVING, KW			90						10			
TOTAL ELECTRIC SAVING, KW			180						200		215	
COMBINED ELECTRIC SAVING, KW	595											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	383											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1136											
PAYBACK PERIOD YRS	<1	27		5	5.9		3				3.1	

(1) 3Degrees C|6 Hr| Day

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
733 GJ	100%		350 GJ
	TOTAL		
Oil 92% 674			Oil 84% 293
Power 8% 59		SAVINGS	Power 16% 57

383 GJ/YEAR

52 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 733 GJ
SUGGESTED ECM2 SAVINGS 383 GJ
FUTURE ANNUAL ENERGY TARGET 350 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 381,000 MJ = 9899 litres
GAS = MJ = m3
ELEC = 2,100 MJ = 595 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Parks & Renewable Resources (Sask)
Field Headquarters
LOCATION Stony Rapids
Sask.
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 2
AGE OF BUILDING NA
LAST MAJOR RENOVATION DATES

SIZE 88.9 m2
BEPI (ACTUAL) 2812 EStimated
BEPI (TARGET) 2114

BUILDING CONTACT PERSON:
NAME Bill Bunko
TITLE Reginal Director, SAS
PHONE 445-6255
PHOTOGRAPHS AVAILABLE YES x NO
NUMBER 2
DESCRIBE· Front view

ENERGY AUDIT SURVEY DATA

DATE 1984
SURVEY TYPE # NA

SURVEY BY: COMPANY NAME
TEAM LEADER

DESCRIPTION Combined office residence toronto split, wood framed & sided building with box beam gable roof & hot air oil heating. (Note electric water heater) Retrofit recommendations, temp set back (3 degrees) vinyl window seal,door weather stripping & furnace set up. Building recently up graded.

ENERGY BALANCE USAGE

BALANCE

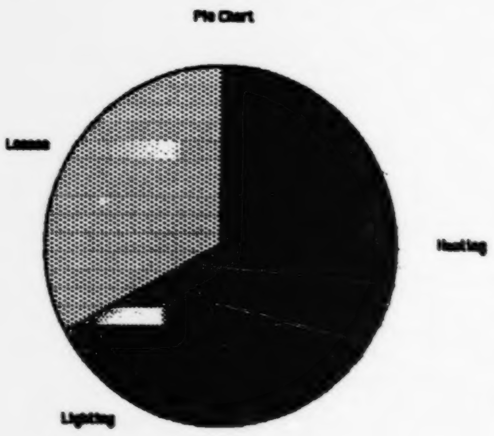
ENERGY IN

FUELS ____________ GJ
ELEC ____________
SOLAR GAIN ____________
____ ____________
____ ____________
____ ____________
TOTALS NA GJ

ENERGY OUT

E.F.F. LOSSES 84 GJ
HEATING 126
COOLING ____________
LIGHTING } 40
MOTORS }
____
____
____
TOTAL OUT 250 GJ

TOTAL ENERGY CONSUMED	100%	250	GJ
WEATHER SENSITIVE PORTION OF ENERGY	6%	40	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	94%	210	GJ



USAGE PIE CHART AND %

HEATING 51 %
COOLING ____________ %
VENTILATION ____________ %
LIGHTING 16 %
MOTORS/PUMPS ____________ %
LOSSES 33 %
MISC ____________ %
____________ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING PRR OFFICE /RESIDENCE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	9.2	1	1 (1)									
SAVINGS PER UNIT $/Y	31											
TOTAL ENERGY SAVINGS $/Y	285	50	130									
COMBINED ENERGY SAVINGS $/Y	465											
UNIT RETROFIT COST $	9.20											
TOTAL RETROFIT COST $	84	139	254									
COMBINED RETROFIT COST $	477											
UNIT FUEL SAVING, L	75											
TOTAL FUEL SAVING, L	690	123	290									
COMBINED FUEL SAVINGS, L	1103											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW			90									
COMBINED ELECTRIC SAVING,KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	42											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	475											
PAYBACK PERIOD YRS	<1	2.7										

(1) 3 degrees C /6 HR/day

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
250 GJ	100% (Estimate)		188 GJ
	TOTAL		
Oil			OIl
84%			90%
210			169
Power			Power
16%			10%
40		SAVINGS	39

42 GJ/YEAR

20 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 208 GJ Estimate
SUGGESTED ECM2 SAVINGS 20 GJ
FUTURE ANNUAL ENERGY TARGET 188 GJ

ACTUAL BEPI = MJ/m^2
TARGET BEPI = MJ/m^2

FUEL TYPE SAVINGS

OIL = 42,000 MJ = 1103 litres
GAS = MJ = m3
ELEC = 300 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING NS Office & Fire Hall

LOCATION Stony Rapids Sask.

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Institutional - Office

CLASSIFICATION

OCCUPANCY TYPE Institutional

OCCUPANCY AVERAGE C

AGE OF BUILDING New building

LAST MAJOR RENOVATION DATES

SIZE 124.4 m2

BEPI (ACTUAL) 5699

BEPI (TARGET) 4677

BUILDING CONTACT PERSON:

NAME Lillian Petit

TITLE Secretary

PHONE 439-2173

PHOTOGRAPHS AVAILABLE YES x NO

NUMBER 3

DESCRIBE Building front, building west side, building rear.

ENERGY AUDIT SURVEY DATA

DATE 1984

SURVEY TYPE # -

SURVEY BY: COMPANY NAME NA

TEAM LEADER

DESCRIPTION New building, combination fire hall and office complex. Single story, double wye, brick/dry wall const. Joist pitched roof, part crawl space, hot air oil furnaces; suggested retrofits, use of econo lamps, auto outside air control (office) and re align weather stripping on O.H. Firebay doors.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 684 GJ

ELEC 25

SOLAR GAIN

TOTALS 709 GJ

ENERGY OUT

E.F.F. LOSSES 270 GJ CALC

HEATING 248

COOLING

LIGHTING 25

MOTORS

HWH 10

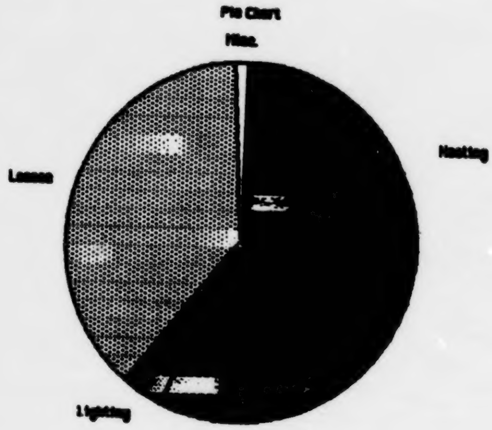
VENT 156

TOTAL OUT 709 GJ

TOTAL ENERGY CONSUMED 100% 709 GJ

WEATHER SENSITIVE PORTION OF ENERGY 95 % 674 GJ

NON--WEATHER SENSITIVE PORTION OF ENERGY 5 % 35 GJ



USAGE PIE CHART AND %

HEATING 35 %

COOLING %

VENTILATION & INF 22 %

LIGHTING 4 %

MOTORS/PUMPS %

LOSSES 38 %

MISC 1 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING NS OFFICE & FIRE HALL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	AUTO ~~MANUAL~~- OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS		2					1 (2)		68			
SAVINGS PER UNIT $/Y		421							3.92			
TOTAL ENERGY SAVINGS $/Y		842					502		267			
COMBINED ENERGY SAVINGS $/Y	1611											
UNIT RETROFIT COST $		177							6.59			
TOTAL RETROFIT COST $		354					1520		448			
COMBINED RETROFIT COST $	2322											
UNIT FUEL SAVING, L		1028										
TOTAL FUEL SAVING, L		2056					1221					
COMBINED FUEL SAVINGS, L	3277											
UNIT ELECTRIC SAVING,KW									10			
TOTAL ELECTRIC SAVING,KW									680			
COMBINED ELECTRIC SAVING,KW	680											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	128.5											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1032											
PAYBACK PERIOD YRS		< 1					3		1.7			

(1) ON Fire bay doors
(2) option 13 with time clock

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
709 GJ 100%		
TOTAL		
Oil		Oil
96%		96%
684		558
Power		Power
4%		4%
25	SAVINGS	22.5

128.5 GJ/YEAR

18 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 709 GJ
SUGGESTED ECM2 SAVINGS 128.5 GJ
FUTURE ANNUAL ENERGY TARGET 580 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 126,000 MJ = 3277 litres
GAS = MJ = m3
ELEC = 2500 MJ = 97 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Community Hall

LOCATION Stony Rapids

Sask

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Community Activities

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE

AGE OF BUILDING

LAST MAJOR RENOVATION DATES

SIZE 458.3 m2

BEPI (ACTUAL) 1274 (1900 Heated Area)

BEPI (TARGET) 901 (1344)

BUILDING CONTACT PERSON:

NAME Lillian Petit

TITLE

PHONE 439-2173

PHOTOGRAPHS AVAILABLE YES x **NO**

NUMBER 2

DESCRIBE· Front view. Side view

ENERGY AUDIT SURVEY DATA

DATE 1984

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Single story steel quonset building,Insulated,originally curling rink converted to assembly hall, slab on grade; appears to be non-code complying in respect to exits lights etc; retrofit recommended, motorized roof vent dampers,temp set back stat, weather stripping,econolamps & improved vestibual.

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Stony Rapids BUILDING NS HALL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS		2	1			5 (1)	1		76			
SAVINGS PER UNIT $/Y		50							1.96			
TOTAL ENERGY SAVINGS $/Y		100	400			1223	502		148			
COMBINED ENERGY SAVINGS $/Y	2373											
UNIT RETROFIT COST $		139	254			1520			6.59			
TOTAL RETROFIT COST $		278				7600	1520		500			
COMBINED RETROFIT COST $	9898											
UNIT FUEL SAVING, L		123										
TOTAL FUEL SAVING, L		246	747			3105	1221					
COMBINED FUEL SAVINGS, L	5229											
UNIT ELECTRIC SAVING,KW									5			
TOTAL ELECTRIC SAVING,KW			247						380			
COMBINED ELECTRIC SAVING,KW	627											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	203											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	443											
PAYBACK PERIOD YRS		2.7				6.2	3		3.4			

(1) Reduce Infiltration by 5.7 m^3/m

(2) 4 Hrs./day

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 584 GJ

ELEC 32

SOLAR GAIN

TOTALS 616 GJ

ENERGY OUT

E.F.F. LOSSES 235 GJ

HEATING 219

COOLING

LIGHTING } 30

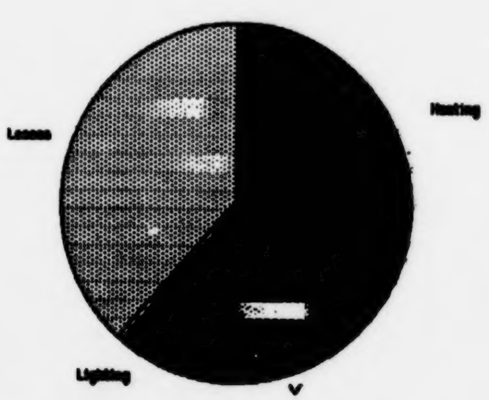
MOTORS }

VENt 133

TOTAL OUT 617 GJ

TOTAL ENERGY CONSUMED	100%	616	GJ
WEATHER SENSITIVE PORTION OF ENERGY	95 %	584	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	5 %	32	GJ

Pie Chart



USAGE PIE CHART AND %

HEATING 35 %

COOLING %

VENTILATION 21 %

LIGHTING 5 %

MOTORS/PUMPS } %

LOSSES 38 } %

MISC %

%

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
616 GJ	100%		413 GJ
	TOTAL		
Oil			Oil
95%			93%
584			383
Power			Power
5%		SAVINGS	7%
32			30
		203 GJ/YEAR	
		33 %	

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 616 GJ
SUGGESTED ECM2 SAVINGS 203 GJ
FUTURE ANNUAL ENERGY TARGET 413 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	201,000	MJ =	5229 litres
GAS =		MJ =	m3
ELEC =	2,200	MJ =	627 KWH
OTHERS		MJ =	
		MJ =	

5. BUILDING SURVEY REPORT

BUILDING RCMP DETACHMENT

LOCATION Stony Rapids
Sask
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Office - Residence

CLASSIFICATION Institutional
OCCUPANCY TYPE
OCCUPANCY AVERAGE See SPC Audit
AGE OF BUILDING
LAST MAJOR RENOVATION DATES

SIZE 288.1 m2

BEPI (ACTUAL) 3059
BEPI (TARGET) 2045

BUILDING CONTACT PERSON:
NAME Mr. Clark or SGt Wilkinson
TITLE Property Man., PA subdivision
PHONE 439-2047, 975-5173
PHOTOGRAPHS AVAILABLE YES x **NO**
NUMBER 8
DESCRIBE · 1-7 detachment exterior views
8, Garage

ENERGY AUDIT SURVEY DATA

DATE Jan. 26/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Enersave
TEAM LEADER Pollock

DESCRIPTION Single story wood frame & sided structure with gable roof and partial basement & part crawl space. Alum slider window (fair) Heated garage. recommended retrofits econo lamps (24) replace outside inc. with HPS(19-150 W units), provide vinyl window seal, use temp set back 3 degrees stats(4 units), weather strip garage door.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 695 **GJ**

ELEC 186

SOLAR GAIN

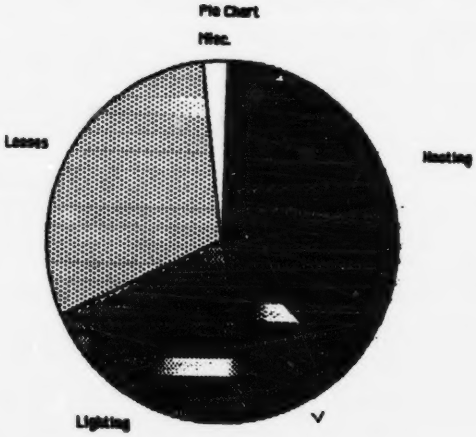
TOTALS 881 **GJ**

(SHOULD BALANCE)

+- 10%

ENERGY OUT	DEPOT	GARAGE
E.F.F. LOSSES	191 GJ	64 GJ
HEATING	198	118
COOLING		
LIGHTING **MOTORS**	186	
VENTS	81	
HWD	14	
TOTAL OUT	670 GJ	182 GJ
	852 GJ	

TOTAL ENERGY CONSUMED	100%	881 GJ
WEATHER SENSITIVE PORTION OF ENERGY	79%	695 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	21%	186 GJ



USAGE PIE CHART AND %

HEATING	37	%
COOLING		%
VENTILATION	10	%
LIGHTING	21	%
MOTORS/PUMPS		%
LOSSES	30	%
MISC	2	%
		%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING RCMP DETACHMENT

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OP 21 EXTERIOR INC. REPLACED WITH HPS LAMPS OTHERS	OTHERS
NUMBER OF UNITS	24	(2)	4				3		86		19	
SAVINGS PER UNIT $/Y	31	50	130$^{(1)}$				502		392		135	
TOTAL ENERGY SAVINGS $/Y	744	100	520				1506		337		2565	
COMBINED ENERGY SAVINGS $/Y	5772											
UNIT RETROFIT COST $	9.20	140	254				1520		6.59		344	
TOTAL RETROFIT COST $	220	280	1016				4560		566		6536	
COMBINED RETROFIT COST $	13,178											
UNIT FUEL SAVING, L	75	123	290				1221					
TOTAL FUEL SAVING, L	1800	246	1160				3663					
COMBINED FUEL SAVINGS, L	6869											
UNIT ELECTRIC SAVING,KW			90						10		347	
TOTAL ELECTRIC SAVING,KW			360						860		6593	
COMBINED ELECTRIC SAVING,KW	7813											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	292											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1015											
PAYBACK PERIOD YRS		2.7	2				3		1.7		2.5	

(1) $3^{0}C/8$ HRS/D

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
881 GJ 100%		589 GJ
TOTAL		
OIL		OIL
79%		83%
695		431
POWER	SAVINGS	POWER
21%		27%
186	292 GJ/YEAR	158
	33 %	

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 881 GJ
SUGGESTED ECM2 SAVINGS 292 GJ
FUTURE ANNUAL ENERGY TARGET 589 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 265,000	MJ = 6869 litres
GAS =	MJ = m3
ELEC = 28,000	MJ = 7813 KWH
OTHERS	MJ =
	MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherage #2

LOCATION Stony Rapids
Saskatchewan

Fed Dept

EMR FILE # SR2, 2

BUILDING PRIMARY USE Residence

CLASSIFICATION Residence
OCCUPANCY TYPE 'A'
OCCUPANCY AVERAGE
AGE OF BUILDING
LAST MAJOR RENOVATION DATES

SIZE 65.2 **m2**

BEPI (ACTUAL) 3849
BEPI (TARGET) 2622

BUILDING CONTACT PERSON:
NAME Eric Hammlar
TITLE Principal
PHONE
PHOTOGRAPHS AVAILABLE YES ___ **NO** ___
NUMBER Front View (south)
DESCRIBE Rear View (north)

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME National Research Council (Hotcan)
TEAM LEADER

DESCRIPTION Wood frame and sided Toronto split structure with gable roof (truss), alum slider windows. Recommended retrofit, vestibule, to avoid excessive lower floor flush out, polywindow seal, set back thermostats (3), power consumption relatively high, indicating possible use of electric heaters in vestibules.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 191 GJ

ELEC 60

SOLAR GAIN

TOTALS 251 GJ

ENERGY OUT

E.F.F. LOSSES 49 GJ

HEATING 60

COOLING

LIGHTING 18

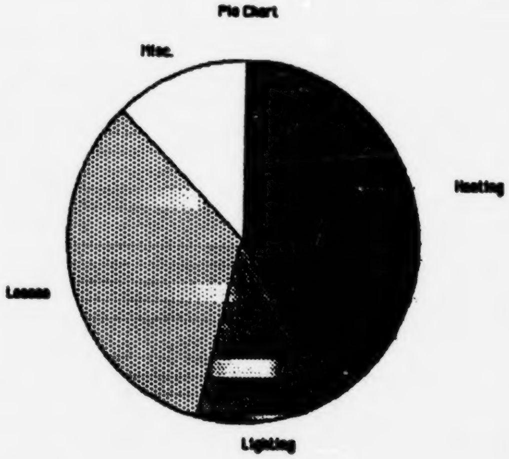
MOTORS & HWH 18

TOTAL OUT 145 GJ

TOTAL ENERGY CONSUMED 100% 251 GJ

WEATHER SENSITIVE PORTION OF ENERGY % 191 GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % 60 GJ



USAGE PIE CHART AND %

HEATING 42 %

COOLING %

VENTILATION %

LIGHTING 12 %

MOTORS/PUMPS %

LOSSES 34 %

MISC 12 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING TEACHERAGE #2

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	VESTI-BULE OP 9 OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	14		1 (1)									
SAVINGS PER UNIT $/Y	31											
TOTAL ENERGY SAVINGS $/Y	434		130	286								
COMBINED ENERGY SAVINGS $/Y	850											
UNIT RETROFIT COST $	9.2											
TOTAL RETROFIT COST $	128		254	1770								
COMBINED RETROFIT COST $	2152											
UNIT FUEL SAVING, L	75											
TOTAL FUEL SAVING, L	1050		290	726								
COMBINED FUEL SAVINGS, L	2066											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW			90									
COMBINED ELECTRIC SAVING, KW	90											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	80											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1226											
PAYBACK PERIOD YRS	1		2	5+								

(1) 3^{o}C/6HRS/D

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
251	100%		
	TOTAL		
OIL			OIL
76%			65%
191			112
POWER			POWER
24%		SAVINGS	35%
60		80 GJ/YEAR	60
		32 %	

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 251 GJ pro-rated
SUGGESTED ECM2 SAVINGS 80 GJ
FUTURE ANNUAL ENERGY TARGET 171 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 79,500 MJ = 2,066 litres
GAS = MJ = m3
ELEC = 326 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING TEACHERAGE #1
Northern Lights School Division
LOCATION Stony Rapids
Saskatchewan
Fed Dept
EMR FILE # SR1. 2

BUILDING PRIMARY USE Residential

CLASSIFICATION Residential
OCCUPANCY TYPE 'A'
OCCUPANCY AVERAGE
AGE OF BUILDING
LAST MAJOR RENOVATION DATES

SIZE 88.9 m2

BEPI (ACTUAL) 3903 PRD Rated
BEPI (TARGET) 3239

BUILDING CONTACT PERSON:
NAME Eric Hammlar
TITLE Principal
PHONE
PHOTOGRAPHS AVAILABLE YES X NO 2
NUMBER Southwest Elevation
DESCRIBE-North Elevation

ENERGY AUDIT SURVEY DATA

DATE 20/3, 1984

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME National Research Council (Hotcan)
TEAM LEADER

DESCRIPTION Wood Frame, Wood sided, single story, gable roof (joist), with basement; very old building. Recommend minimum attic insulation, attic door, vinyl window seal, set back thermostat.

ENERGY BALANCE USAGE

BALANCE

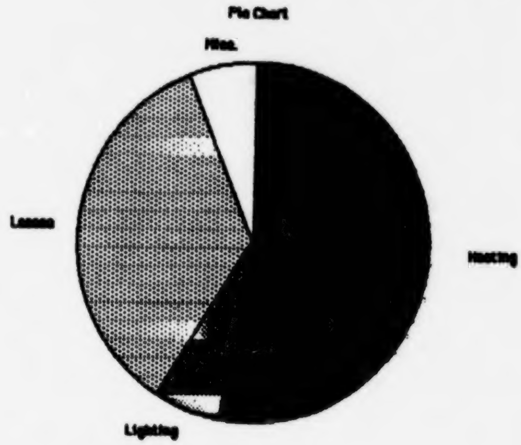
ENERGY IN

FUELS	264	GJ
ELEC	83	
SOLAR GAIN		
TOTALS	347 Prorated Figure	GJ

ENERGY OUT

E.F.F. LOSSES	116	GJ
HEATING	174	
COOLING		
LIGHTING **MOTORS**	18	
HWH	18	
TOTAL OUT	326	GJ

TOTAL ENERGY CONSUMED	100%	347	GJ
WEATHER SENSITIVE PORTION OF ENERGY	76 %	264	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	24 %	83	GJ



USAGE PIE CHART AND %

HEATING	53	%
COOLING		%
VENTILATION		%
LIGHTING	6	%
MOTORS/PUMPS		%
LOSSES	35	%
MISC	6	%
		%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY STONY RAPIDS BUILDING TEACHERAGE #1

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	(1) OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	10.3	1	1 (3)	88.9								
SAVINGS PER UNIT $/Y	15(2)			3.45								
TOTAL ENERGY SAVINGS $/Y	154	50	130	306								
COMBINED ENERGY SAVINGS $/Y	640											
UNIT RETROFIT COST $	9.20			17.30								
TOTAL RETROFIT COST $	154	140	254	1537								
COMBINED RETROFIT COST $	2085											
UNIT FUEL SAVING, L	37			8.4								
TOTAL FUEL SAVING, L	381	123	290	747								
COMBINED FUEL SAVINGS, L	1541											
UNIT ELECTRIC SAVING, KW												
TOTAL ELECTRIC SAVING, KW	90		90									
COMBINED ELECTRIC SAVING, KW												
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	59.3											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	667											
PAYBACK PERIOD YRS	< 1.0	2.7	2	5								

(1) Basement insulation could be considered along with residing and new windows or building replacement.
(2) Poly film on exterior presently being used. This would offer estimated 50% saving.
(3) 3°C/6HR/D.

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
347 GJ	100%		288 GJ
	TOTAL		
OIL			OIL
76%			71%
264			205
POWER		SAVINGS	POWER
23%			29%
83		59.3 GJ/YEAR	82
		17 %	

% + GJ OF EACH ENERGY TYPE

19~~84~~ ANNUAL ENERGY CONSUMPTION 347 GJ Pro-rated
SUGGESTED ECM2 SAVINGS 59 GJ
FUTURE ANNUAL ENERGY TARGET 288 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 59,000 MJ = 1541 litres
GAS = MJ = m3
ELEC = 300 MJ = 90 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Band Hall

LOCATION Wollaston Lake

Fed Dept DIAND

EMR FILE #

BUILDING PRIMARY USE Assembly Hall

CLASSIFICATION Institution

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 4

AGE OF BUILDING 8

LAST MAJOR RENOVATION DATES

SIZE 260 m2

BEPI (ACTUAL) 2434

BEPI (TARGET) 1742

BUILDING CONTACT PERSON:

NAME Amile

TITLE

PHONE 633-2003

PHOTOGRAPHS AVAILABLE YES X NO 1

NUMBER

DESCRIBE· Front

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC - Hotcan

TEAM LEADER

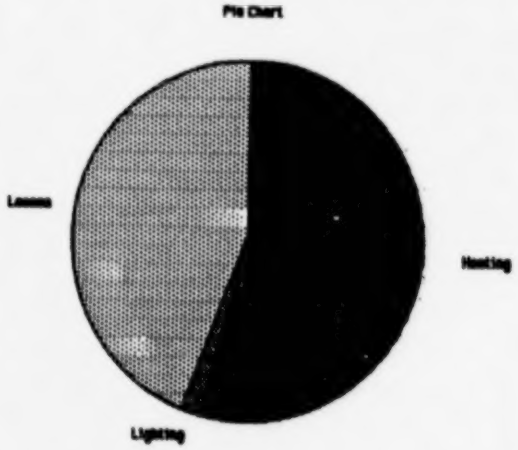
DESCRIPTION Wood frame and sided, single story truss joist roof, insulated floor, non-insulated crawl space, oil furnaces (2). Fuel bills for 3 buildings; retrofit suggested, insulate crawl space perimeter (if not done to date), use set back thermostats, use motorized dampered outside air inlet and use econo lamps.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	620 GJ	E.F.F. LOSSES	274 GJ
ELEC	13	HEATING AND VENT	336
SOLAR GAIN		COOLING	
		LIGHTING	13
		MOTORS	
TOTALS	633 GJ		
(SHOULD BALANCE) +- 10%		TOTAL OUT	623 GJ

TOTAL ENERGY CONSUMED	100%	633	GJ
WEATHER SENSITIVE PORTION OF ENERGY	98 %	620	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	2 %	13	GJ



USAGE PIE CHART AND %

HEATING	54	%
COOLING		%
VENTILATION		%
LIGHTING	2	%
MOTORS/PUMPS		%
LOSSES	44	%
MISC		%
		%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY WOLLASTON LAKE BUILDING BAND HALL

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	ADD FLOOR INSU-LATION OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	(1) OTHERS	OTHERS
NUMBER OF UNITS			(3)		260		2		98 (2)			
SAVINGS PER UNIT $/Y					345		502		1.86			
TOTAL ENERGY SAVINGS $/Y					897		1004		183			
COMBINED ENERGY SAVINGS $/Y	2083											
UNIT RETROFIT COST $					17.30		1520		6.59			
TOTAL RETROFIT COST $					4498		3040		645			
COMBINED RETROFIT COST $	8183											
UNIT FUEL SAVING, L					8.40		1221					
TOTAL FUEL SAVING, L					2184		2442					
COMBINED FUEL SAVINGS, L	4626											
UNIT ELECTRIC SAVING,KW									5			
TOTAL ELECTRIC SAVING,KW									490			
COMBINED ELECTRIC SAVING,KW	490											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	180											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	692											
PAYBACK PERIOD YRS					5		3		3.4			

(1) Consider heat recovery if buildings to be reconsidered.
(4) 4 HRS/D operation.
(3) Manual set back to 15°C.

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
633 GJ	100%		453 GJ
	TOTAL		
OIL			OIL
98%			98%
620			442
POWER			POWER
2%		SAVINGS	2%
13		180 GJ/YEAR	11
		28 %	

% + GJ OF EACH ENERGY TYPE

19__ ANNUAL ENERGY CONSUMPTION 633 GJ
SUGGESTED ECM2 SAVINGS 180 GJ
FUTURE ANNUAL ENERGY TARGET 453 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 178,000 MJ = 4626 litres
GAS = MJ = m3
ELEC = 1,700 MJ = 490 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING BAND OFFICES

LOCATION WOLLASTON LAKE

Fed Dept DIAND
EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institution
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 4+
AGE OF BUILDING 8
LAST MAJOR RENOVATION DATES -

SIZE 76 m2

BEPI (ACTUAL) 2486 (Pro-rated figure)
BEPI (TARGET) 1565

BUILDING CONTACT PERSON:
NAME Amile
TITLE
PHONE 633-2003
PHOTOGRAPHS AVAILABLE YES X NO
NUMBER 1
DESCRIBE· Front

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC - Hotcan
TEAM LEADER

DESCRIPTION Wood frame and sided single story, gable roof, crawl space, oil furnace heated house. Fuel bills for office and hall under one account, office to be replaced in near future, retrofit measures, vinyl window seal, set back thermostat, ceiling insulation and econo lamps.

ENERGY BALANCE USAGE

BALANCE

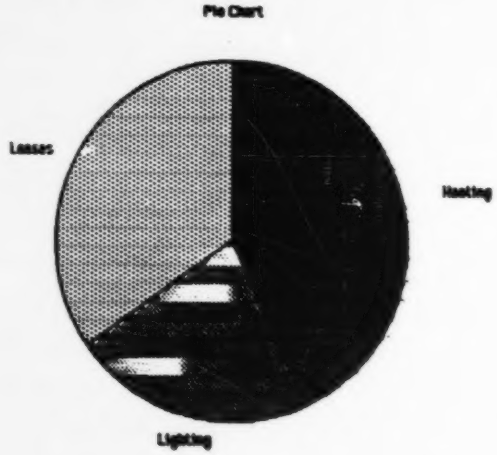
ENERGY IN

FUELS 185 GJ (Prorated)
ELEC 4±
SOLAR GAIN
TOTALS 189 GJ

ENERGY OUT

E.F.F. LOSSES 55 GJ
HEATING 68
COOLING
LIGHTING } 36
MOTORS
TOTAL OUT 159 GJ

TOTAL ENERGY CONSUMED 100% 189 GJ
WEATHER SENSITIVE PORTION OF ENERGY 98% 185 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY 2% 4 GJ



USAGE PIE CHART AND %

HEATING 43 %
COOLING %
VENTILATION %
LIGHTING } 22 %
MOTORS/PUMPS %
LOSSES 35 %
MISC %
%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY WOLLASTON LAKE BUILDING BAND OFFICE

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	5.5		1	76								
SAVINGS PER UNIT $/Y	31			3.45								
TOTAL ENERGY SAVINGS $/Y	170		400	262								
COMBINED ENERGY SAVINGS $/Y	832											
UNIT RETROFIT COST $	9.20			17.30								
TOTAL RETROFIT COST $	50		254	1315								
COMBINED RETROFIT COST $	1619											
UNIT FUEL SAVING, L	75			8.4								
TOTAL FUEL SAVING, L	412		747	638								
COMBINED FUEL SAVINGS, L	1797											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW			247									
COMBINED ELECTRIC SAVING,KW	247											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	70											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	919											
PAYBACK PERIOD YRS	< 1		< 1	5								

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
189 GJ 100%		119 GJ
TOTAL		
OIL		OIL
98%		98%
185		116
POWER		POWER
2%	SAVINGS	2%
4	70 GJ/YEAR	3
	31 %	

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 189 GJ
SUGGESTED ECM2 SAVINGS 70 GJ
FUTURE ANNUAL ENERGY TARGET 119 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 69,000 MJ = 1797 litres
GAS = MJ = m3
ELEC = 900 MJ = 247 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING SCHOOL
Northern Lights School Division
LOCATION WOLLASTON LAKE
SASKATCHEWAN
Fed Dept
EMR FILE #

BUILDING PRIMARY USE SCHOOL

CLASSIFICATION INSTITUTION
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 211
AGE OF BUILDING 23
LAST MAJOR RENOVATION DATES NA

SIZE 1111 **m2**
BEPI (ACTUAL) 2276
BEPI (TARGET) 1931

BUILDING CONTACT PERSON:
NAME GRAEME WESSON
TITLE PRINCIPAL
PHONE 633-2144
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 16
DESCRIBE · Main building - 2 of each direction +1, & 1 - shop, 1 - port. #2, 3 - port. #1, 2 - gym

ENERGY AUDIT SURVEY DATA

DATE August 7, 1984
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME Sask Power Enersave and NRC Hotcan
TEAM LEADER Pollock

DESCRIPTION See following page

Wollaston School Description

The Wollaston School consists of 5 buildings in total including:

-	Central School	8509 (787 m^2)
-	Portable Class Rm #1	768 (71 m^2)
-	Portable Class Rm #2	1024 (94 m^2)
-	Shop	600 (55 m^2)
-	Gym (games room)	1080 (100 m^2)

All the buildings with the exception of the shop are portables of a single story wood frame construction with wood or similar siding with some flat and some gable roof construction. All buildings with exception of shop have crawl spaces. Buildings are heated with oil fired hot air furnaces (12 in total). Hot water is provided with one oil fired HWH and one Electric HWH. The breakdown of respective load is unknown. The school is due for replacement in the near future therefore only short term retrofits are assessed.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 2241 GJ

ELEC 288

SOLAR GAIN

TOTALS 2529 GJ

ENERGY OUT

E.F.F. LOSSES 896 GJ

HEATING 1028

COOLING

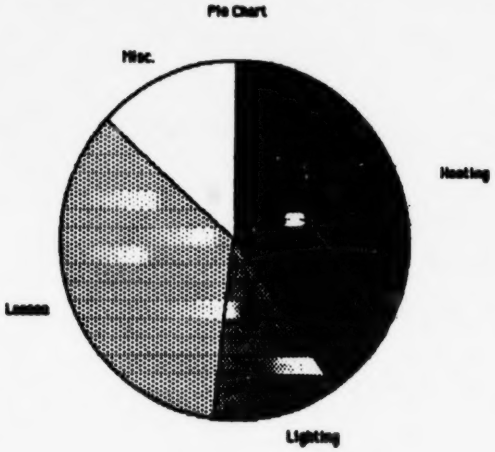
LIGHTING 288

MOTORS

HOT WATER 316

TOTAL OUT 2528 GJ

TOTAL ENERGY CONSUMED	100%	2529	GJ
WEATHER SENSITIVE PORTION OF ENERGY	76%	1925	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	24%	604	GJ



USAGE PIE CHART AND %

HEATING 40 %

COOLING %

VENTILATION %

LIGHTING 12 %

MOTORS/PUMPS %

LOSSES 35 %

MISC 13 %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING School

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	Op #13 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO- FLUORESCENT LAMPS	Op #19 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	(1)	Done	12 (2)				3			9		
SAVINGS PER UNIT $/Y	(31)		266				502			63		
TOTAL ENERGY SAVINGS $/Y			3192				1506			567		
COMBINED ENERGY SAVINGS $/Y	5265											
UNIT RETROFIT COST $	(9.20)		254				1520			88		
TOTAL RETROFIT COST $			3048				4560			792		
COMBINED RETROFIT COST $	8400											
UNIT FUEL SAVING, L			498				1221					
TOTAL FUEL SAVING, L			5976				3663					
COMBINED FUEL SAVINGS, L	9639											
UNIT ELECTRIC SAVING,KW			165							160		
TOTAL ELECTRIC SAVING,KW			1980							1440		
COMBINED ELECTRIC SAVING,KW	3420											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	383											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	345											
PAYBACK PERIOD YRS	< 1.0		1				3			1		

(1) in secured area not likely to be vandalized
(2) 20 KW units

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
2529 GJ	100%		2146 GJ
	TOTAL		
Oil 88% 2241			Oil 87% 1870
Power 12% 288		SAVINGS 383 GJ/YEAR 15 %	Power 13% 276

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 2529 GJ
SUGGESTED ECM2 SAVINGS 383 GJ
FUTURE ANNUAL ENERGY TARGET 2146 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 371,000 MJ = 9639 litres
GAS = MJ = m3
ELEC = 12,000 MJ = 3420 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING H & W Clinic (New)

LOCATION Wollaston Lake,
Saskatchewan

Fed Dept H & W Canada

EMR FILE #

BUILDING PRIMARY USE Health Clinic & Residence

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 4

AGE OF BUILDING 1

LAST MAJOR RENOVATION DATES

SIZE 739 m2

BEPI (ACTUAL) 1082 Calculated

BEPI (TARGET)

BUILDING CONTACT PERSON:

NAME Sheila MacPherson

TITLE Nurse

PHONE 6632167

PHOTOGRAPHS AVAILABLE YES X **NO**

NUMBER 3

DESCRIBE- Front, Back Side

ENERGY AUDIT SURVEY DATA

DATE 29/11/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME UMA

TEAM LEADER

DESCRIPTION Single story wood frame and sided gable roof building with insulated crawl space, propane fired hot air heating, condensing furnaces, R3.5 in wall and R7.0 in ceiling; Outside air to furnace manual dampers, triple glazed windows. Some insulation problems with vapour barrier seal. No retrofit proposed.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS ____________ GJ

ELEC ____________

SOLAR GAIN ________

____ ____________

____ ____________

____ ____________

TOTALS NA GJ

ENERGY OUT

E.F.F. LOSSES 67 GJ

HEATING ________________

COOLING ________________

LIGHTING 130

MOTORS ________________

____

____

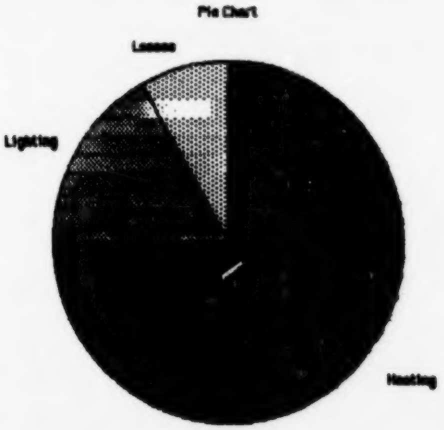
____

TOTAL OUT 800 GJ

TOTAL ENERGY CONSUMED 100% ____________ GJ

WEATHER SENSITIVE PORTION OF ENERGY % ____________ GJ

NON-WEATHER SENSITIVE PORTION OF ENERGY % ____________ GJ



USAGE PIE CHART AND %

HEATING 75 %

COOLING ____________ %

VENTILATION ____________ %

LIGHTING 17 %

MOTORS/PUMPS ____________ %

LOSSES 8 %

MISC ____________ %

____________ %

5. BUILDING SURVEY REPORT

BUILDING RCMP Office

LOCATION Wollaston Lake, Saskatchewan

Fed Dept RCMP

EMR FILE #

BUILDING PRIMARY USE Office

CLASSIFICATION Institutional

OCCUPANCY TYPE C

OCCUPANCY AVERAGE 2

AGE OF BUILDING NA

LAST MAJOR RENOVATION DATES

SIZE 26 m2

BEPI (ACTUAL) 3538

BEPI (TARGET) 2407

BUILDING CONTACT PERSON:

NAME Jim Altwasser

TITLE Property Manager PA Subdivision

PHONE 359-6445

PHOTOGRAPHS AVAILABLE YES X NO

NUMBER 3

DESCRIBE Front, Back & Side elevation views.

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC Hot Can

TEAM LEADER

DESCRIPTION Mobile home type portable. "Atco" propane fired warm air furnace, crawl space, alum. slider windows, recommended Retrofit; vinyl window seal, temp set back stat (3^oC), vestibule (high flush out with small building

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 66 GJ

ELEC 26

SOLAR GAIN ____

____ ____

____ ____

____ ____

TOTALS 92 GJ

ENERGY OUT

E.F.F. LOSSES 24.87 GJ

HEATING 22.23

COOLING ____

LIGHTING 36.80

MOTORS ____

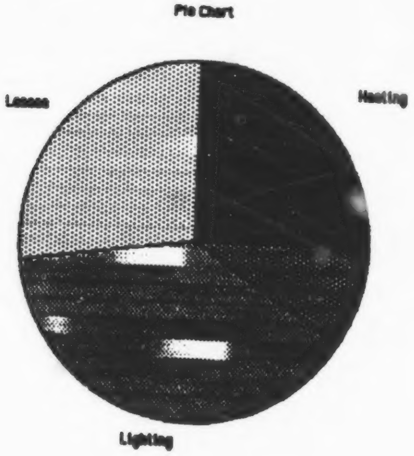
Vent 8.1

____

____

TOTAL OUT 92 GJ

TOTAL ENERGY CONSUMED	100%	92	GJ
WEATHER SENSITIVE PORTION OF ENERGY	71 %	66	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	29 %	26	GJ



USAGE PIE CHART AND %

HEATING 25 %

COOLING ____ %

VENTILATION 9 %

LIGHTING 39 %

MOTORS/PUMPS ____ %

LOSSES 27 %

MISC ____ %

____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING RCMP Office

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Vest. OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	OP #20 REPLACE INCANDESCENT LAMPS WITH ~~FLUORESCENT~~ HPS	OTHERS	OTHERS
NUMBER OF UNITS	2		1		1			1		2		
SAVINGS PER UNIT $/Y	33									84		
TOTAL ENERGY SAVINGS $/Y	66		336		327			1566 (1)		168		
COMBINED ENERGY SAVINGS $/Y	2463											
UNIT RETROFIT COST $	9.2									261		
TOTAL RETROFIT COST $	18.40		254					5123		522		
COMBINED RETROFIT COST $	5917											
UNIT FUEL SAVING, L	112											
TOTAL FUEL SAVING, L	224		1120		1089			5220				
COMBINED FUEL SAVINGS, L	7653											
UNIT ELECTRIC SAVING,KW										215		
TOTAL ELECTRIC SAVING,KW			247							430		
COMBINED ELECTRIC SAVING,KW	677											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	29.4											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1130											
PAYBACK PERIOD YRS	<1		< 1		5.9			3		3.1		

(1) 20% saving (net)

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
92 GJ	100%		62.6 GJ
	TOTAL		
Propane 72% 66 Power 28% 26		SAVINGS	Propane 62% 39 Power 38% 23.6

SAVINGS

29.4 GJ/YEAR

32 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 92 GJ

SUGGESTED ECM2 SAVINGS 29.4 GJ

FUTURE ANNUAL ENERGY TARGET 62.6 GJ

ACTUAL BEPI = MJ/m2

TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 27,000 MJ = 7653 litres

GAS = MJ = m3

ELEC = 2,400 MJ = 677 KWH

OTHERS MJ =

MJ =

5. BUILDING SURVEY REPORT

BUILDING NS Office and Hall

LOCATION Wollaston Lake
Saskatchewan

Fed Dept

EMR FILE #

BUILDING PRIMARY USE Office & Assembly

CLASSIFICATION Institutional
OCCUPANCY TYPE b
OCCUPANCY AVERAGE 1-2
AGE OF BUILDING 15
LAST MAJOR RENOVATION DATES NA

SIZE 179 **m2**

BEPI (ACTUAL) 6033
BEPI (TARGET) 4324

BUILDING CONTACT PERSON:

NAME Terry Daniels
TITLE Administration
PHONE 633-2188
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE · Front & Back Views

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC Hot Can
TEAM LEADER

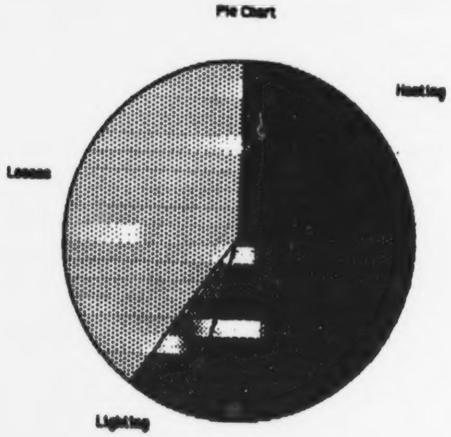
DESCRIPTION Wood frame and sided single story, Gable Truss roof, crawl space building. Used @ nite for bingos, smoke problems so doors left open during games. Have problems with ballast burnout. Retrofit, Vestibule, weatherstripping, new light fixtures, manual outside air vent control and upgrade floor and ceiling insulation.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN		ENERGY OUT	
FUELS	1016 GJ	E.F.F. LOSSES	430 GJ
ELEC	64	HEATING	260
SOLAR GAIN		COOLING	
		LIGHTING	64
		MOTORS	
		Venting(1)	326 Balance
TOTALS	1080 GJ		
		TOTAL OUT	1080 GJ

TOTAL ENERGY CONSUMED	100%	1016	GJ
WEATHER SENSITIVE PORTION OF ENERGY	94 %	952	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	6 %	64	GJ



USAGE PIE CHART AND %

HEATING 24 %

COOLING %

VENTILATION 30 %

LIGHTING 6 %

MOTORS/PUMPS %

LOSSES 40 %

MISC %

%

(1) Very High, possible reasons, furnace fan covers off or open doors, exhaust fan on long periods.

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING NS Office & Hall

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Floor Insul. OTHERS	MANUAL VENTILATION CONTROL	Op #13 MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	Vest. #9 OTHERS	OTHERS
NUMBER OF UNITS		2	2	179	179		2				1	
SAVINGS PER UNIT $/Y		50	400	3.45	3.45		502					
TOTAL ENERGY SAVINGS $/Y		100	800	182	617		1004				286	
COMBINED ENERGY SAVINGS $/Y	2989											
UNIT RETROFIT COST $		139	254	17.30	17.30		1520					
TOTAL RETROFIT COST $		278	508	3096	3096		3040				1770	
COMBINED RETROFIT COST $	11,788											
UNIT FUEL SAVING, L		123	747	8.4	8.4		1221					
TOTAL FUEL SAVING, L		246	1494	1503	1503		2442				726	
COMBINED FUEL SAVINGS, L	7914											
UNIT ELECTRIC SAVING,KW			247									
TOTAL ELECTRIC SAVING,KW			494									
COMBINED ELECTRIC SAVING,KW	494											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	306											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	1709											
PAYBACK PERIOD YRS		2.7	< 1	5.0	5.0		3.0				5.9	

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
1080 GJ	100%		774 GJ
	TOTAL		
Oil			Oil
94%			92%
1016			712
Power			Power
6%			8%
64		SAVINGS	62

SAVINGS

306 GJ/YEAR

30 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 1080 GJ
SUGGESTED ECM2 SAVINGS 306 GJ
FUTURE ANNUAL ENERGY TARGET 774 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 305,000 MJ = 7914 litres
GAS = MJ = m3
ELEC = 1,800 MJ = 494 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Community College
Former Health CLinic
LOCATION Wollaston Lake
Saskatchewan
Fed Dept
EMR FILE #

BUILDING PRIMARY USE Education

CLASSIFICATION Institutional
OCCUPANCY TYPE C
OCCUPANCY AVERAGE 12
AGE OF BUILDING NA
LAST MAJOR RENOVATION DATES

SIZE 227 m2
BEPI (ACTUAL) 2202CaLc.
BEPI (TARGET) 1700

BUILDING CONTACT PERSON:
NAME Dave Colot
TITLE Treasurer
PHONE 425-2480
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE Front & Back

ENERGY AUDIT SURVEY DATA

DATE Aug 7/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME SPC Ener Save
TEAM LEADER Pollock

DESCRIPTION Single story wood frame portables, two section residence and classroom. One gable roof, second flat roof, insulated floor, oil fired hot air furnaces. Inc. lighting retrofit recommendation vinyl window kits, temp set back, ceiling insulation (gable roof)

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 128 **GJ**

ELEC 25.2

SOLAR GAIN ______

______ ______

______ ______

______ ______

TOTALS 154 **GJ**

Incomplete billing
Data

ENERGY OUT

E.F.F. LOSSES 213 **GJ**

HEATING 261

COOLING ______

LIGHTING 25

MOTORS ______

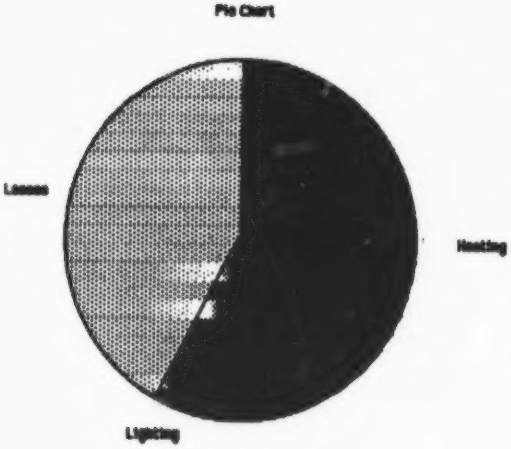
______

______

______

TOTAL OUT 500 **GJ**

TOTAL ENERGY CONSUMED **100%** 500 **GJ** EST
WEATHER SENSITIVE PORTION OF ENERGY 95**%** 475 **GJ**
NON-WEATHER SENSITIVE PORTION OF ENERGY 5**%** 25 **GJ**



USAGE PIE CHART AND %

HEATING 52 **%**

COOLING ______ **%**

VENTILATION ______ **%**

LIGHTING 6 **%**

MOTORS/PUMPS ______ **%**

LOSSES 42 **%**

MISC ______ **%**

______ **%**

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING Community College

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	Op#19 REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	18		1	93						6		
SAVINGS PER UNIT $/Y	31			3.45						63		
TOTAL ENERGY SAVINGS $/Y	558		400	320						378		
COMBINED ENERGY SAVINGS $/Y	1656											
UNIT RETROFIT COST $	9.20			17.30						88		
TOTAL RETROFIT COST $	165		254	1608						528		
COMBINED RETROFIT COST $	2555											
UNIT FUEL SAVING, L	75			8.4								
TOTAL FUEL SAVING, L	1350		747	781								
COMBINED FUEL SAVINGS, L	2878											
UNIT ELECTRIC SAVING,KW										160		
TOTAL ELECTRIC SAVING,KW			247							960		
COMBINED ELECTRIC SAVING,KW	1207											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	114											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	503											
PAYBACK PERIOD YRS	< 1		< 1	5						1.4		

ENERGY SOURCES & TARGETS

BEFORE	IMPLEMENTATION OF ECM2	AFTER
500 GJ Est. 100%		
TOTAL		

SAVINGS

114 GJ/YEAR

23 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 500 estimate GJ
SUGGESTED ECM2 SAVINGS 114 GJ
FUTURE ANNUAL ENERGY TARGET 386 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	110,000	MJ =	2878	litres
GAS =		MJ =		m3
ELEC =	4,300	MJ =	1207	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Teacherage Duplex (olive)
Northern Lights School Division
LOCATION Wollaston Lake

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residential

CLASSIFICATION A
OCCUPANCY TYPE 4
OCCUPANCY AVERAGE NA
AGE OF BUILDING
LAST MAJOR RENOVATION DATES

SIZE 89 m2
BEPI (ACTUAL) 3134 C
BEPI (TARGET) 2191

BUILDING CONTACT PERSON:
NAME Graeme Wesson
TITLE Principal
PHONE 633-2144
PHOTOGRAPHS AVAILABLE YES X NO
NUMBER 2
DESCRIBE- Front & Back

ENERGY AUDIT SURVEY DATA

DATE 20/3/84
SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC Hot Can
TEAM LEADER

DESCRIPTION Wood frame and sided, gable roof, toronto Split, duplex (separate upper and lower floor) leaky vinyl slider windows, recommended vinyl window film, temp set back and ceiling insulation and HW heater conversion

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 364 GJ

ELEC 51

SOLAR GAIN

TOTALS 415 GJ
Pro Rated

ENERGY OUT

E.F.F. LOSSES 101 GJ

HEATING 124

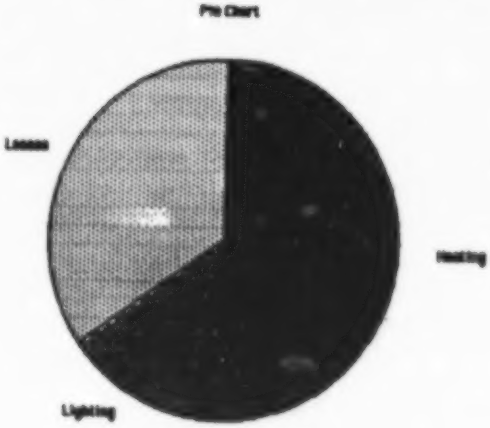
COOLING

LIGHTING 54

MOTORS

TOTAL OUT 279 GJ

TOTAL ENERGY CONSUMED	100%	415	GJ
WEATHER SENSITIVE PORTION OF ENERGY	88 %	364	GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY	12 %	51	GJ



USAGE PIE CHART AND %

HEATING 53 %

COOLING %

VENTILATION %

LIGHTING 12 %

MOTORS/PUMPS %

LOSSES 35 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING Teacherage - Duplex (Green Toronto Split)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Oil Hot Water Heater OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	10.9		1(1)	89	1							
SAVINGS PER UNIT $/Y	31			3.45								
TOTAL ENERGY SAVINGS $/Y	337		130	307	472							
COMBINED ENERGY SAVINGS $/Y	1246											
UNIT RETROFIT COST $	9.20			17.30								
TOTAL RETROFIT COST $	100		254	1539	1400							
COMBINED RETROFIT COST $	3293											
UNIT FUEL SAVING, L	75			8.4								
TOTAL FUEL SAVING, L	817		290	747	-188 GALS							
COMBINED FUEL SAVINGS, L	1666											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW			90		5475							
COMBINED ELECTRIC SAVING,KW	5565											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	84											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	943											
PAYBACK PERIOD YRS	1		2	5	3							

(1) 3°C

ENERGY SOURCES & TARGETS

BEFORE

IMPLEMENTATION OF ECM2

AFTER

279 GJ Calculated 100%

195 GJ

TOTAL

SAVINGS

84 GJ/YEAR

30 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 279 GJ Cal.
SUGGESTED ECM2 SAVINGS 84 GJ
FUTURE ANNUAL ENERGY TARGET 195 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 64,000 MJ = 1666 litres
GAS = MJ = m3
ELEC = 20,000 MJ = 5565 KWH
OTHERS MJ =
MJ =

5. BUILDING SURVEY REPORT

BUILDING Teacherages - Toronto Split 1A & 1B
Northern Lights School Division
LOCATION Wollaston Lake

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residence

CLASSIFICATION Residential
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 4
AGE OF BUILDING NA
LAST MAJOR RENOVATION DATES

SIZE 76 m2

BEPI (ACTUAL) 2921 C
BEPI (TARGET) 1947

BUILDING CONTACT PERSON:
NAME Graeme Wesson
TITLE Principal
PHONE 633-2144
PHOTOGRAPHS AVAILABLE YES X NO
NUMBER 2
DESCRIBE - Front & Back

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC Hot Can
TEAM LEADER

DESCRIPTION Wood Frame and sided gable roof, toronto split, duplex. Leaky Sliders; recommended vinyl window film, temp. set back and ceiling insulation and HW heater conversion.

ENERGY BALANCE USAGE

BALANCE

ENERGY IN

FUELS 306 GJ

ELEC 43

SOLAR GAIN

TOTALS 349 GJ
pro rated

ENERGY OUT

E.F.F. LOSSES 83 GJ

HEATING 102

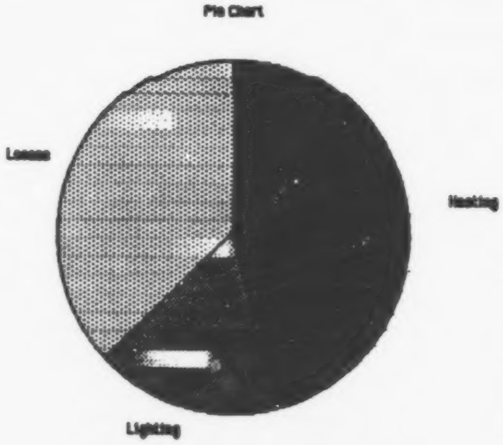
COOLING

LIGHTING 37

MOTORS

TOTAL OUT 222 GJ

TOTAL ENERGY CONSUMED	100%	349	GJ	Pro rated
WEATHER SENSITIVE PORTION OF ENERGY	88 %	306	GJ	
NON-WEATHER SENSITIVE PORTION OF ENERGY	12 %	43	GJ	



USAGE PIE CHART AND %

HEATING 46 %

COOLING %

VENTILATION %

LIGHTING 17 %

MOTORS/PUMPS %

LOSSES 37 %

MISC %

%

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING Teacherage 1A-1B

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	Oil Hot Water Heater OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	8.7		1	76	1							
SAVINGS PER UNIT $/Y	31			3.45								
TOTAL ENERGY SAVINGS $/Y	269		130	262	472							
COMBINED ENERGY SAVINGS $/Y	1133											
UNIT RETROFIT COST $	9.20			17.30								
TOTAL RETROFIT COST $	80		254	1314	1400							
COMBINED RETROFIT COST $	3048											
UNIT FUEL SAVING, L	75			8.4								
TOTAL FUEL SAVING, L	652		290	638	-188 Gals.							
COMBINED FUEL SAVINGS, L	1392											
UNIT ELECTRIC SAVING,KW												
TOTAL ELECTRIC SAVING,KW			90		5475							
COMBINED ELECTRIC SAVING,KW	5565											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	74											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	973											
PAYBACK PERIOD YRS	< 1		2	5	3							

ENERGY SOURCES & TARGETS

BEFORE		IMPLEMENTATION OF ECM2	AFTER
222 GJ Calc.	100%		148 GJ
TOTAL			

SAVINGS

74 GJ/YEAR

33 %

% + GJ OF EACH ENERGY TYPE

19 84 ANNUAL ENERGY CONSUMPTION 222 GJ
SUGGESTED ECM2 SAVINGS 74 GJ
FUTURE ANNUAL ENERGY TARGET 148 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL =	54,000	MJ =	1392	litres
GAS =		MJ =		m3
ELEC =	20,000	MJ =	5565	KWH
OTHERS		MJ =		
		MJ =		

5. BUILDING SURVEY REPORT

BUILDING Four Teacherages (Portables)
Northern Lights School Divison
LOCATION Wollaston Lake, Sask.

Fed Dept
EMR FILE #

BUILDING PRIMARY USE Residential

CLASSIFICATION Residential
OCCUPANCY TYPE A
OCCUPANCY AVERAGE 4
AGE OF BUILDING NA
LAST MAJOR RENOVATION DATES

SIZE 249 m2 Gross

BEPI (ACTUAL) 2678 C
BEPI (TARGET) 1755

BUILDING CONTACT PERSON:

NAME Graeme Wesson
TITLE Principal
PHONE 633-2144
PHOTOGRAPHS AVAILABLE YES X **NO**
NUMBER 2
DESCRIBE - Front & Back

ENERGY AUDIT SURVEY DATA

DATE 20/3/84

SURVEY TYPE # 2

SURVEY BY: COMPANY NAME NRC Hot Can
TEAM LEADER

DESCRIPTION 4-mobile home type portable units with small crawl space, oil fire heating and electric hot water heating (little room for oil) retrofit recommendation vinyl window film, temp set back stats. Estimated fuel consumption figures appear high for structures as reported.

ENERGY BALANCE USAGE

BALANCE

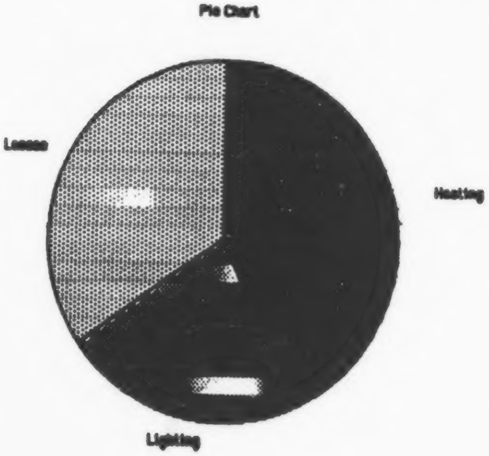
ENERGY IN

FUELS 1017 GJ
ELEC 145
SOLAR GAIN ____
____ ____
____ ____
____ ____
TOTALS 1162 GJ

ENERGY OUT

E.F.F. LOSSES 234 GJ
HEATING 285
COOLING ____
LIGHTING 148
MOTORS ____
____
____
____
TOTAL OUT 667 GJ

TOTAL ENERGY CONSUMED 100% 1162 GJ
WEATHER SENSITIVE PORTION OF ENERGY 88% 1017 GJ
NON-WEATHER SENSITIVE PORTION OF ENERGY 12 % 145 GJ



USAGE PIE CHART AND %

HEATING 43 %
COOLING ____ %
VENTILATION ____ %
LIGHTING 22 %
MOTORS/PUMPS ____ %
LOSSES 35 %
MISC ____ %
____ %

ENERGY CONSERVATION RETROFIT OPTIONS

COMMUNITY Wollaston Lake BUILDING Teacherages (4-Portables)

	WINDOWS VINYL FILM	EXTERIOR DOORS WEATHER STRIP	TEMPERATURE SET BACK THERMOSTAT	ROOF (ATTIC) INSULATION	OTHERS	MANUAL VENTILATION CONTROL	MANUAL OUTSIDE AIR CONTROL	NEW CONDENSING FURNACES	ECONO-FLUORESCENT LAMPS	REPLACE INCANDESCENT LAMPS WITH FLUORESCENT	OTHERS	OTHERS
NUMBER OF UNITS	64		4(1)									
SAVINGS PER UNIT $/Y	31		130									
TOTAL ENERGY SAVINGS $/Y	1984		520									
COMBINED ENERGY SAVINGS $/Y	2504											
UNIT RETROFIT COST $	9.20		254									
TOTAL RETROFIT COST $	588		1016									
COMBINED RETROFIT COST $	1604											
UNIT FUEL SAVING, L	75		290									
TOTAL FUEL SAVING, L	4800		1160									
COMBINED FUEL SAVINGS, L	5960											
UNIT ELECTRIC SAVING,KW			90									
TOTAL ELECTRIC SAVING,KW			360									
COMBINED ELECTRIC SAVING,KW	360											
COMBINED FUEL & ELECTRIC SAVING (ITEM 10 & 13) GJ	230											
COMBINED UNIT ENERGY SAVING, (MJ/M2)	230											
PAYBACK PERIOD YRS	< 1		2									

(1) 3°C

ENERGY SOURCES & TARGETS

BEFORE IMPLEMENTATION OF ECM2 AFTER

667 GJ 100% 437 GJ

TOTAL

SAVINGS

230 GJ/YEAR

34 %

% + GJ OF EACH ENERGY TYPE

1984 ANNUAL ENERGY CONSUMPTION 667 GJ
SUGGESTED ECM2 SAVINGS 230 GJ
FUTURE ANNUAL ENERGY TARGET 437 GJ

ACTUAL BEPI = MJ/m2
TARGET BEPI = MJ/m2

FUEL TYPE SAVINGS

OIL = 22,900 MJ = 5960 litres
GAS = MJ = m3
ELEC = 1,200 MJ = 360 KWH
OTHERS MJ =
MJ =

6.0 SUMMARY AND RECOMMENDATIONS

6.1 The identified purpose of the study was to assess alternate energy forms and conservation measures that could be used and resorted to, to reduce fuel oil consumption in institutional buildings (93) located in various communities (10) throughout Northern Saskatchewan, a list of the buildings, community locations and responsible agencies are summarized in Table 6.1 at the end of this chapter.

Alternate energy sources investigated included, solar energy, wind energy, chunk wood, chip wood, peat and small scale hydro. Small scale uranium reactors were not included for lack of information.

6.2 Only one of the alternate energy forms (wood chip) was suggested as warranting further investigation in the form of a demonstration installation. Solar and wind power potential was weak when needed most i.e., mid winter. A typical example indicated a payback period of 14 years for a solar installation at Stony Rapids.

6.3 A number of small scale hydro schemes have been identified as technically feasible near a number of communities under study, however, none were identified as being economically viable under present day conditions. This conceivably could change with the introduction of an industry in a potential area. It is recommended that hydro development particularly at Stony Rapids/Black Lake and Southend be re-evaluated should industrial potential be identified in such areas.

6.4 Chunk wood, used extensively throughout Northern Saskatchewan for home heating, was identified as being readily available in most of the Communities studied to satisfy institutional heating requirements.

An annual cost comparison of using chunk wood to that of using fuel oil was made for 4 communities (shown in Table 4.1 in Chapter 4). It indicates an 18% fuel cost saving over oil when using a five year payback for capital costs. Not included in the cost comparison was the administration cost of directing the wood chunk operation.

A break even situation would require that this be rendered for less than 18 percent of the total fuel cost or approximately $10,000 per community per year. The table and the foregoing indicate that there is no significant potential saving in fuel costs when using chunk wood as opposed to oil to offset the associated encumbrances.

6.5 Using chipped wood with auto furnace stokers would avoid the inconvenience and attendance requirements of chunk wood firing system. A cost review however, indicated that if administration cost were assessed against the operation, it would not be competitive to oil firing as indicated in the following:

Wood Supply (Raw)		54.00
Capital Amortization 10%/10 yrs.		
Fenced Compound	$10,000	
Chipper	25,000	
Chipper Storage Shed	35,000	
Haul Truck	15,000	
Total	$85,000	
$\frac{\$85,000 \times 0.162}{1000 \text{ Cords/yr}(277,000 \text{ L oil/yr})}$	=	13.77
Chipper Fuel		1.47
Maintenance		4.31
Labour (Chipper & Haul)		10.77
Haul, Fuel & Oil		2.15
Contingency 15%		12.97
		$100.44/cord

= $0.37/L equivelent fuel oil cost

A chip wood supply operation would involve planning and management and would afford one opportunity for on-site term learning in planning and management techniques in an education program. This is recommended for further consideration by joint agencies such as Indian Affairs and Employment and Immigration Canada.

6.6 Extensive deposits of peat suitable for fuel use are reported to exist in portions of Northern Saskatchewan. A pilot test on mining and burning the peat in domestic type furnaces was conducted at Buffalo Narrows, Saskatchewan. That study indicated local peat from a technical point could be successfully mined and fired as an alternate fuel.

In economic terms a peat harvesting scheme large enough to supply the entire need of a community such as Deschambault Lake including that for power generation (using 90%) is identified as being required to reduce the unit cost of peat sod to where it would be compeditive with oil for institutional buildings. This is illustrated in Table 4.4 in Chapter 4.

However, a study by Bell & Associates, Monenco Ltd. indicated that the cost of peat generated power would be $0.58/kWh or considerably higher than the diesel generated alternative. This would indicate that without power generation use, the peat sod cost for the remaining community would have to increase ten fold to $480/ton for a viable operation making it uneconomical for institutional use and prohibitive for home use.

6.7 Ninety-three (93) institutional buildings were energy audited in prior studies (CEAP) and assessd for upgrading measures to reduce energy consumption. Twenty-three retrofit options are presented in Chapter 3 and these together with a number of site specific options were considered for each building. On-site evaluation was made by a two man team to assess the applicability of the respective retrofit options.

These are summarized at the end of this Chapter in Table 6.1. It is recommended the responsible agencies be encouraged to carry out the proposed energy conservation retrofit measures.

6.8 The report has been so arranged in chapters to permit the issuance of mini reports to the various responsible agencies for the institutional buildings. For example Chapter 2, 3 and applicable portion of 5 is suggested to form the excerpted contents of the mini reports.

TABLE 6.1

Page 1 of 9

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Black Lake	Teacherage D	DIAND	138	15950	1673	768	3, 6, 8 & 10	3716	1352	2.7
Black Lake	Teacherage S	DIAND	80		1656	1118	6, 8, 10 & 24	1746	467	3.7
Black Lake	Teacherage S	DIAND	80		1656	1118	6, 8, 10 & 24	1746	467	3.7
Black Lake	Teacherage - 4 Plex	DIAND	257		2136	1151	3, 6, 8, 10 & 24	9779	2729	3.5
Black Lake	School	DIAND	1195	88095	4845	2995	8, 9, 10, 14, 15 & 16	40,264	29,974	1.3
Black Lake	Health Clinic	H & W Canada	185	20,146	4372	4037	3, 8, 10 & 18	1,143	1,253	1
Black Lake	Band Office	Band	115	6308	4687	3573	3, 6, 8, 10, 16 & 24	3,149	1,543	2
Black Lake	CDO Building	Sask Tel	18	5020	2600	2161	2, 6 & 7	6,950	857	8
Black Lake	Band Hall	Band	209	12,303	3631	2449	6, 8, 10, 13, 16 & 24	7,193	4,494	1.6

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
5. Triple Glazing
6. Vinyl Window Film
7. Storm Door
8. Weather Stripping
9. Vestibule
10. Set Back Thermostat
11. Floor Direct Heating

13. Furnace O/A Control
14. Furnace O/A and Fan Control
15. New Condensing Furnace
16. Relays with Econo-Watt Fluroscent (F)
17. Relamp & Reballast with Efficient Units
18. Relamp Incandescent (I) with Socket (F)
19. Replace 150 Watt (I) with (F)
20. Replace Exterior (I) with HPS
21. Replace Exterior Par Lamps with HPS
22. Replace Exterior 250 Watt M.V. to HPS
23. Convert Diesel Gen. Direct Fan Drive to Electric Clutch

Page 2 of 9

TABLE 6.1

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Brabant Lake	DNS W'hse	Lac	109	NA	NA	NA	3, 6, 8, 10 & 18	802	532	1.5
Brabant Lake	School	Northern Lights	770	41,645	1,429	1,304	8, 11, 13, 16, 19, 20	11,794	5,626	2.0
							& 22			
Brabant Lake	Teacherage	Northern Lights	197	5,351	1,426	781	3, 6, 8, 10	4,895	1,380	3.5
Brabant Lake	CDO	Sask Tel		5,020			None			
Camsell Portage	Power Plant	North Sask Eltc.					23	9,000	3,360	2.7
Camsell Portage	School	Northern Lights	191	10,695	3,219	2,225	6, 8, 10, 14, 16 & 24	4,130	2,339	1.7
Camsell Portage	PRR W'hse	Sask Supply & S	44	N/A			6 & 8	158	112	1.4
Camsell Portage	Teacherage	Northern Lights	60	3,822	3,700	2,660	3, 6, 8, 10 & 15	1,640	672	2.4

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
5. Triple Glazing
6. Vinyl Window Film
7. Storm Door
8. Weather Stripping
9. Vestibule
10. Set Back Thermostat
11. Floor Direct Heating

13. Furnace O/A Control
14. Furnace O/A and Fan Control
15. New Condensing Furnace
16. Relays with Econo-Watt Fluroscent (F)
17. Relamp & Reballast with Efficient Units
18. Relamp Incandescent (I) with Socket (F)
19. Replace 150 Watt (I) with (F)
20. Replace Exterior (I) with HPS
21. Replace Exterior Par Lamps with HPS
22. Replace Exterior 250 Watt M.V. to HPS
23. Convert Diesel Gen. Direct Fan Drive to Electric [illegible]

TABLE 6.1

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Deschambault										
Lake	School	Northern	2,234	125,617	1,321	1,091	10, 14, 16, 22 & 24	21,428	13,699	1.6
Deschambault L.	Teacherage 2	Lights	69	21,055	2,289	1,739	6, 8 & 10	592	425	1.4
Deschambault L.	Teacherage 2	School	69		2,289	1,739	6, 8 & 10	592	425	1.4
Deschambault L.	Teacherage	Division								
	Triplex		355		1,873	1,363	6, 8 & 10	1,979	1,961	1
Deschambault L.	Community Hall	Band	173	6,643	1,809	1,115	3, 8, 10, 16 & 24	4,320	1,418	3
Deschambault L.	RCMP Office	RCMP	27	1,262	1,376		None			
Deschambault L.	Band Office	Band	98	N/A			3, 6, 8 & 10	2,289	1,097	2
Deschambault L.	Community Rink	Band	2,009	21,451	662	577	1, 3, 10, 15, 16, 20			
							& 24	7,653	3,022	2.5
Deschambault L.	Power Plant	North Sask Power					23	13,500	5,333	2.5
Deschambault L.	Health Clinic	H & W Canada	172	7,170	4,703	4,166	10, 14 (15), 16 & 20	7,438	2,685	2.8

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
5. Triple Glazing
6. Vinyl Window Film
7. Storm Door
8. Weather Stripping
9. Vestibule
10. Set Back Thermostat
11. Floor Direct Heating

13. Furnace O/A Control
14. Furnace O/A and Fan Control
15. New Condensing Furnace
16. Relays with Econo-Watt Fluroscent (F)
17. Relamp & Reballast with Efficient Units
18. Relamp Incandescent (I) with Socket (F)
19. Replace 150 Watt (I) with (F)
20. Replace Exterior (I) with HPS
21. Replace Exterior Par Lamps with HPS
22. Replace Exterior 250 Watt M.V. to HPS
23. Convert Diesel Gen. Direct Fan Drive to Electric Clutch

TABLE 6.1

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Fond du Lac	Band Office	Band	477	32,442	3,150	1,887	6, 10, 13, 16 & 24	9,190	6,974	1.3
Fond du Lac	& Hall Complex									
Fond du Lac	School Portables	Band								
	(Three)	DIAND	294	107,718	5,578	4,653	8, 10, 14, 16	7,857	4,656	1.7
Fond du Lac	School Core	DIAND	685		5,552	4,660	6, 8, 10, 12, 14 & 16	15,096	17,015	1
Fond du Lac	School Gym	DIAND	196		5,693	5,209	8, 10, 12, 14 & 19	3,174	1,978	1.6
Fond du Lac	Sask Tel CDO	Sask Tel	46	5,020	995	696	1, 7 & 5	7,950	1,526	5.2
Fond du Lac	Storage	Band		0			None			
Fond du Lac	Teacherage Dup	DIAND	163	18,829	2,667	2,110	6, 8 & 10	1,220	993	1.2
Fond du Lac	Teacherage S	DIAND	78		2,661	2,179	6 & 10	336	409	0.8
Fond du Lac	Teacherage S	DIAND	78		2,661	2,179	6 & 10	336	409	0.8
Fond du Lac	Teacherage S	DIAND	89		2,640	1,224	3, 6, 10 & 24	2,771	1,351	2
Fond du Lac	Nurses Res.	H & W Can (1)					None			
Fond du Lac	Teacherage D.	DIAND	163		2,667	2,110	6, 8 & 10	1,220	993	1.2

(1) Under Construction

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
5. Triple Glazing
6. Vinyl Window Film
7. Storm Door
8. Weather Stripping
9. Vestibule
10. Set Back Thermostat
11. Floor Direct Heating
13. Furnace O/A Control
14. Furnace O/A and Fan Control
15. New Condensing Furnace
16. Relays with Econo-Watt Fluroscent (F)
17. Relamp & Reballast with Efficient Units
18. Relamp Incandescent (I) with Socket (F)
19. Replace 150 Watt (I) with (F)
20. Replace Exterior (I) with HPS
21. Replace Exterior Par Lamps with HPS
22. Replace Exterior 250 Watt M.V. to HPS
23. Convert Diesel Gen. Direct Fan Drive to Electric Clutch

TABLE 6.1

Page 5 of 9

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Garson Lake	School (2)	Northern Lights	179	12,367	5,888	4,910	3, 6, 8, 10 & 19	5,783	3,064	1.9
Garson Lake	Teacherage	Northern Lights	56	4,234	8,650	7,282	3, 6, 8 & 10	1,567	913	1.7
Kinoosao	PRR Office	SAS	53	NA	1,716 C	1,471	10 & 18	422	210	2.0
Kinoosao	School	Northern Lights	178	10,940	1,544	1,062	9, 10, 16, 18 & 24	4,057	2,261	1.8
Kinoosao	Hall	NH					Abandoned			
Kinoosao	Power Plant	North Sask Elec.					23	9,000	4,666	2
Kinoosao	Teacherage	Northern Lights	89	4,055	1,943	2,022	6, 8, 10, 18 & 24	1,961	1,325	1.5
Kinoosao	Sask Tel CDO	Sask Tel	46	5,020	995	696	1, 7 & 5	7,950	1,526	5.2

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
5. Triple Glazing
6. Vinyl Window Film
7. Storm Door
8. Weather Stripping
9. Vestibule
10. Set Back Thermostat
11. Floor Direct Heating
13. Furnace O/A Control
14. Furnace O/A and Fan Control
15. New Condensing Furnace
16. Relays with Econo-Watt Fluroscent (F)
17. Relamp & Reballast with Efficient Units
18. Relamp Incandescent (I) with Socket (F)
19. Replace 150 Watt (I) with (F)
20. Replace Exterior (I) with HPS
21. Replace Exterior Par Lamps with HPS
22. Replace Exterior 250 Watt M.V. to HPS
23. Convert Diesel Gen. Direct Fan Drive to Electric Clutch

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TABLE 6.1

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m²	Annual Energy Cost	Present BPI MJ/m²	Target BPI MJ/m²	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Southend	School	Northern Lights	1,520	46,629	779	709	16 & 18	3,255	2,189	1.5
Southend	School	DIAND	475	51,064	6,200	5,340	8, 10 & 24	9,536	6,278	2.0
Southend	Kindergarten	DIAND	88.9		2,384	1,609	3, 10 & 16	1,944	894	2.0
Southend	Portable	DIAND	75.4		1,843	1,282	10 & 16	570	652	1.0
Southend	Band Hall	Band	293	3,853	1,081		2, 3, 9, 10 & 19	23,912	3,097	8.0
Southend	Sask Tel CDO	Sask Tel	36	5,020	1,300	905	1, 5 & 7	7,950	1,526	5.0
Southend	Teacherage	DIAND	226	3,760	969	615	6, 8 & 10	1,780	854	2.0
Southend	Teacherage	DIAND	175		2,685	1,314	2, 3, 6, 8 & 10	10,363	2,576	4.0
Southend	Band Office	Band	111	3,033	2,063	1,513	10 & 24	754	656	1
Southend	Power Plant	North Sask Power					NA			
Southend	PBR Office	Sas	177	2,672*	1,474	842	3, 6, 8, 10 & 24	3,531	1,290	2.7
Southend	Warehouse									
Southend	Rec Centre	Band	150 (1,615	9,747+	231	202	10, 16 & 24	1,158	1,072	1.
Southend	Health Clinic	H & W Canada	214	18,676	4,439	4,042	6, 8, 10 & 18	1,203	1,372	1.
Southend	NH Office	NH	48	5,383	8,208	5,687	6, 8, 9, 10 & (24)	1,945	1,953	1.
Southend	NH Hall	NH	131	1,185	679	534	8 & 24	639	198	3.2

* Oil Only
+ Power Only

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
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7. Storm Door
8. Weather Stripping
9. Vestibule
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23. Convert Diesel Gen. Direct Fan Drive to Electric Clutch

TABLE 6.1

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ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Stony Rapids	School	Northern Lights	1,369	84,332	3,305	2,674	10, 14, 16 & 22	20,100	16,076	1.2
Stony Rapids	Health Clinic	Sask Northern	337	13,479	2,175	1,038	3, 6, 8, 9, 13, 16	12,197	4,245	2.8
		Health Service					& 20			
Stony Rapids	PRR	SAS	89		2,812E	2,114	6, 8 & 10	477	465	1.
Stony Rapids	NS Office &	NS	124	10,063	5,699	4,677	14, 16 & 24	2,322	1,611	1.4
	Fire Hall									
Stony Rapids	Community Hall	NS	458	9,771	1,900 (1)	1,344	8, 10, 14, 16 & 24	9,898	2,373	4.1
Stony Rapids	RCMP Detachment	RCMP	288	14,984	3,059	2,045	6, 8, 10, 13, 16 &	13,178	5,772	2.3
							& 21.			
Stony Rapids	Teacherage	Northern Lights	65	10, 463	3,849	2,622	6, 9 & 10	2,152	850	2.5
Stony Rapids	Teacherage	Northern Lights	88.9		3,903	3,239	3, 6, 8 & 10	2,085	640	3.2
Stony Rapids	Sask Tel CDO	Sask Tel	18	5,020	1,300	905	1, 5 & 7	7,950	1,526	5

(1) Heated Area

Legend

1. Exterior Wall Insulation
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23. Convert Diesel Gen. Direct Fan Drive to Electric Clutch

TABLE 6.1

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ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Wollaston	Band Hall	Band	260	14,624	2,434	1,742	13, 16 & 24	8,183	2,083	3.9
Wollaston	Band Office	Band	76		2,486	1,565	3, 6 & 10	1,619	832	2.
Wollaston	School	Northern Lights	1,111	59,980	2,276	1,931	6, 10, 13, 16 & 19	8,400	5,265	1.6
Wollaston	Health Clinic	H & W Canada	739		1,082 C					
Wollaston	RCMP Office	RCMP	26	11,398	3,538	2,407	6, 9, 10, 15 & 20	5,917	2,463	2.4
Wollaston	Lac Hall &	Lac	179	15,483	6,033	4,324	3, 8, 9, 10, 13 & 24	11,788	2,989	3.9
	Office									
Wollaston	Former Health	Sask Ed.	227	11,090(1)	2,202	1,700	3, 6, 10 & 19	2,555	1,656	1.5
	Clinic-Now									
	Community College									
Wollaston	Teacherage D.	Norther Lights	89	22,204	3,134C	2,191	3, 6, 10 & 24	3,293	1,246	2.6
Wollaston	Teacherage D.	Northern Lights	76		2,921C	1,947	3, 6, 10 & 24	3,048	1,133	2.7
Wollaston	Teacherage	Northern Lights	249		2,678C	1,755	6 & 10	1,604	2,504	1
	4-Portables									
Wollaston	Sask Tel	Sask Tel	18	5,020			None			

(1) Operating as Health Clinic

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
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TABLE 6.1

ENERGY CONSERVATION OPTIONS SUMMARY

Community	Building	Responsible Agency	Floor Area m^2	Annual Energy Cost	Present BPI MJ/m^2	Target BPI MJ/m^2	Proposed Upgrading/ Retrofit Options (See Abbrev.)	Cost Of Improvements Dollars	Annual Savings Dollars	Payback Period Years
Black Lake	9			149,902				75,686	43,136	
Brabant Lake	4			52,016				17,491	7,538	
Camsell Portage	4			14,517 (1)				14,928	6,483	
Deschambault L.	10			183,198				59,791	30,065	
Fond du Lac	14			164,009				49,150	36,304	
Garson Lake	3			16,601				7,350	3,977	
Kinoosao	6			20,015 (1)				23,390	9,988	
Southend	15			151,022				68,540	24,607	
Stony Rapids	9			148,112				70,359	33,558	
Wollaston L.	19			139,799				46,407	20,171	
	93 (2)			1,039,191				433,092	215,827	

(1) Power Plant Not Included
(2) 96 Surveyed

Legend

1. Exterior Wall Insulation
2. Interior Wall Insulation
3. Ceiling Insulation
4. Roof Insulation
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Table 6.2.1

NORTHERN INSTITUTIONAL BUILDINGS ENERGY SUMMARY TABLES

Community	Building	Agency	Floor area (m2)	Roof (RSI)	Wall (RSI)	Windows (%)	Annual Electrical Consumption (KWH)	Annual Electrical Consumption (Value)	Heating Fuel Type	Annual Heating Fuel Consumption (Gallon)	Annual Heating Fuel Consumption (KWH)	Annual Heating Fuel Consumption (Value)	Calculated Losses: Building Envelope Losses (Gallon)	Calculated Losses: Building Envelope Losses (KWH)	Calculated Losses: Ventilation Losses (Gallon)	Calculated Losses: Ventilation Losses (KWH)	Calculated Losses: Ventilation Losses (CFM)	TOTAL ANNUAL FUEL CONSUMPTION (KWH)	TOTAL ANNUAL FUEL CONSUMPTION (Value $)
1. Black Lake																			
	1. Teacherages (4)	DIAND	502	3.6	2.1	11.2	23,720	6,080	#2 Oil	4,871	234,048	9,070	2,104	100,871	2,772	133,077	460	257,768	15,050
	2. School	DIAND	1200	2.1	2.1	14.5	73,500	20,663	#2 Oil	31,852	1,534,940	56,433	10,322	495,433	19,660	944,120	3,300	1,608,440	80,006
	3. Health Clinic	MHC	105	2.1	2.1	6.5	37,560	17,140	#2 Oil	4,004	167,342	7,447	2,583	123,960	1,424	68,374	327	204,902	28,146
	4. Band Office	BAND	116	2.1	2.1	9.5	5,057	2,221	#2 Oil	3,066	144,635	4,680	1,562	74,860	1,440	69,140	330	149,857	6,366
	5. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020
	6. Community Hall	BAND	210	3.6	2.1		17,881	6,896	#2 Oil	4,032	193,667	5,484	2,667	127,796	1,374	65,968	315	211,376	12,383
2. BRABANT LAKE																			
	1. DNS/Const/Warehouse	SJA	110	(UNDER CONSTRUCTION)															
	2. School	Sask. Ed.	757	3.6	2.1	3.8	61,645	35,755	#2 Oil	4,462	214,343	5,895	3,053	146,561	1,399	67,145	350	305,873	41,645
	3. Teacherage	Sask. Ed.	65	3.6	2.1	16	20,127	3,123	#2 Oil	1,214	58,271	2,258	829	39,766	385	18,483	80	78,388	5,381
	4. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020
3. CAMSELL PORTAGE																			
	1. North Sask Electric	SPC		(UNHEATED)															
	2. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020
	3. School	Sask. Ed.	167	2.1	2.1	17	13,372	5,147	#2 Oil	3,393	158,530	5,466	2,043	98,052	1,260	60,460	260	163,727	10,666
	4. DNS Building	SJA		(UNHEATED)															
	5. Teacherage	Sask. Ed.	60	2.8	1.4	12.8	13,439	1,556	#2 Oil	1,003	48,310	1,872	313	14,993	694	33,310	124	61,749	3,022
4. DESCHAMBAULT LAKE																			
	1. School	Sask.	2242	2.1	3.6	11.1	267,120	104,177	#2 Oil	11,327	553,262	21,440	4,973	236,727	6,553	314,565	1,500	820,412	125,617
	2. Teacherages	Sask. Ed.	421	2.1	1.4		93,966	13,692	#2 Oil	4,164	199,872	7,351	2,276	109,259	1,888	90,613	433	293,861	21,046
	3. Community hall	Provincial	176	2.1	2.1	7.8	10,470	4,083	#2 Oil	1,895	76,860	2,969	2,166	103,966				87,330	6,642
	4. RCMP	RCMP					2,472	865	#2 Oil	165	7,920	297						10,392	1,265
	5. Band office	BAND	54	2.1	2.1	11.5	3,672	1,366					870	41,752					
	6. Community rink	Provincial	166	3.6	3.6	8.7	19,260	7,511	#2 Oil	7,553	360,281	13,655	2,155	103,441				379,541	21,461
	7. North Sask. Electric	SPC		(UNHEATED)															
	8. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020
	9. Health Clinic	MHC	173	3.3	3.6	13.4	7,688	3,076	Propane	3,320	107,034	4,063	1,224	56,731	990	47,543	360	114,822	7,150
5. FOND DU LAC																			
	1. Band Office, Hall and Clinic	BAND/MHC	377	3.5	3.2	9.6	30,013	10,505	#2 Oil	7,104	341,450	12,937	3,367	172,176	3,510	168,826	850	371,463	32,442
	2. Classrooms		90	2.8	3.4	6.3							1,204						
	School	DIAND	686	3.1	3.1	4.2	108,879	42,773	#2 Oil	35,683	1,714,120	64,943	8,432	547,011	25,532	1,225,348	6,330	1,823,000	107,716
	Mini Gym		196	5.5	3.4	1.8							1,712						
	3. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020
	4. Storage			(UNHEATED)															
	5. Teacherages	BAND/LHA	505	3.6	2.1	11.6	19,541	3,317	#2 Oil	8,413	403,824	15,312	4,600	221,079	3,007	182,745	750	423,365	18,629
	6. N.W. Residence	MHC		(NEW BUILDING - NO DATA AVAILABLE)															
6. GARSON LAKE																			
	1. School	Sask Ed.	180	2.1	1.4	4.4	10,6[illegible]	2,9[illegible]	#2 Oil	7,054	267,612	8,467	2,033	136,805	3,201	150,520	740	12,307	280,812
	2. Teacherage	Sask Ed.	57	3.6	1.4	6.9			#2 Oil	2,677	135,472	4,234	228	10,926				135,472	4,234
7. KINOOSAO																			
	1. Resource Office - DNS	SJA	53	2.1	2.1	14.1			#2 Oil	1,[illegible]	72,055	2,385	858	41,220	642	30,760	137		
	2. School - Provincial	Sask Ed.	126	2.1	2.1	11.1	13,273	8,[illegible]	#2 Oil	1,114	53,472	1,814						76,745	10,942
	3. Hall																		
	4. North Sask. Electric	SPC																	
	5. Teacherage	Sask Ed.	69	3.6	2.1	11.6	20,1[illegible]	3,1[illegible]	#2 Oil	555	21,210	632	419	22,554	117	5,616	30	40,247	4,052
	6. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020

Table 6.2.2

NORTHERN INSTITUTIONAL BUILDINGS ENERGY SUMMARY TABLES

Building	Agency	Floor Area (m2)	Roof (RSI)	Wall (RSI)	Windows (%)	Annual Electrical Consumption		Heating Fuel Type	Annual Heating Fuel Consumption			Calculated Losses					TOTAL ANNUAL FUEL CONSUMPTION	
						(KWH)	(Value $)		(Gallon)	(KWH)	(Value $)	Building Envelop (Gallon)	(KWH)	Ventilation Losses (Gallon)	(KWH)	(CFM)	(KWH)	(Value $)
[illegible]																		
1. School	Sask Ed.	1,376	8.9	7.1	7.9	115,074	44,675	a) Coal b) Wood	5 (tons) 55 (cords)	41,000 275,000	100 1,650	1,540	73,918	5,007	240,320	1,930	431,074	46,629
2. School (BAND)	DNIA	276	1.8	1.4	21.5	59,281	23,120	#2 Oil	15,766	758,416	27,945	7,026	337,239	7631	366,287	1,800	817,697	51,064
Kindergarten		85	2.1	2.1	8.9							1,128	54,125					
3. Community Hall	BAND	284	2.1	2.1	2.1	1,710	657	#2 Oil	1,800	88,400	3,186						90,350	3,853
4. Sask Tel	Sask Tel	18	3.6	3.6	3.5	13,000	5,020	Electric					11,653				13,000	5,020
5. Teacherages (2)	DNIA	140	3.6	2.1	15.0	17,645	2,263	#2 Oil	906	43,462	1,497	516	24,756	380	18,720	90	61,107	3,760
6. Band Office	BAND	112	1.4	1.4	9.5	1,845	739	#2 Oil	1,285	81,680	2,274	525	25,219	760	36,401	162	83,625	3,035
7. North Sask Electrical	SPC	31	(UPDATED)															
8. DNS Warehouse/Office	DUA	178	2.1	2.1	6.1			#2 Oil	1,510	72,480	2,072	997	47,839	513	24,841	110		
9. Recreation Complex	BAND	150	3.6	3.6	1.0	24,935	9,747											
10. Health Clinic	HWC	241	2.1	2.1	8.1	25,950	10,120	#2 Oil	4,961	238,133	8,556	2,274	109,153	2,887	128,980	550	264,083	18,676
11. DNS Office	Provincial	48	2.1	2.1	9.3	3,819	1,486	#2 Oil	2,260	105,682	3,894	1,123	53,921	1,067	51,200	260	109,501	5,383
12. DNS Hall	Provincial	131	2.1	2.1	3.7	768	305	#2 Oil	500	24,019	885	1,533	73,567				24,787	1,185
STONY RAPIDS																		
1. School	Sask. Ed.	1,968	3.6	3.2	6.3	104,573	39,738	#2 Oil	23,985	1,152,230	44,614	8,105	389,030	15,777	757,272	3,600	1,256,803	84,352
2. Health Clinic	HWC	336	3.6	2.1	16.0	16,393	6,229	#2 Oil	3,898	187,104	7,250	2,797	134,245	1,101	52,848	252	203,497	13,479
3. Resources Office	Provincial																	
4. NB - office/fire hall	Provincial	164	3.2	3.2	12.5	6,836	2,705	#2 Oil	3,956	190,030	7,358	2,402	115,275	1,565	75,114	370	196,877	10,061
5. Community Hall	Provincial	432	1.4	1.4	1.0	8,957	3,493	#2 Oil	3,375	162,127	6,277						171,044	9,771
6. RCMP	RCMP	286	3.8	1.8	13.0	51,750	9,160	#2 Oil	4,017	192,967	5,825	2,015	98,721	1,696	81,394	333	244,717	14,941
7. Teacherage	Sask. Ed.	172	2.1	2.1	14.4	40,126	5,933	#2 Oil	2,636	128,549	4,560	918	44,056	1,718	82,472	340	168,545	10,465
8. Sask Tel	Sask Tel	18	3.6	3.8	3.5	13,000	5,020	Electric					11,653				13,000	5,020
WOLLASTON																		
1. Band Hall	Band	262	3.3	2.1	4.4	4,907	1,914	#2 Oil	5,300	284,200	12,210	1,224	182,027	1,604	76,992	360	289,113	14,624
2. Band Office	Band	76	2.1	2.1	7.4							2,580						
3. School	Sask. Ed.	736	2.1	2.1	20.0	80,000	31,200	#2 Oil	12,964	622,750	28,780	8,845	424,557	4,110	187,701	1,122	702,750	59,980
4. DNIA Health Office	DIAND		(NEW BUILDING - NO FUEL DATA AVAILABLE)															
5. RCMP	RCMP	26	3.6	3.2	8.0	7,274	2,837	Propane	8,137	18,329	8,561	270	12,972	112	5,357	28	25,603	11,398
6. NB Office & Hall		179	3.6	2.1	5.0	17,900	7,016	#2 Oil	5,880	282,240	8,487	1,711	82,120				300,230	15,483
7. H&W Clinic & Residence	Federal	227	2.1	2.1	12.0	24,194	9,436	#2 Oil	745	35,788	1,654						59,983	11,090
8. Teacherage		668	3.6	2.1	8.8	66,655	7,578	#2 Oil	9,765	468,720	14,716	2,248	133,947	8,974	334,752	878	535,375	22,204
9. Sask Tel	Sask Tel	18	3.6	3.8	3.5	13,050	5,020	Electric					11,653				13,000	5,020

APPENDIX A

ENERGY CONSERVATION/OFF OIL STUDY FOR INSTITUTIONAL BUILDINGS IN SASKATCHEWAN'S REMOTE COMMUNITIES

RETROFIT OPTION ENERGY SAVING CALCULATIONS

Option 1 & 2
Energy Saving

$$\frac{1}{1.7} - \frac{1}{3.4} \quad \times 9050 \times \frac{24 \times 3600 \times 0.40}{.80 \times 38.5 \times 10^6} = \$2.96/m^2/yr$$

$$\frac{1}{RSI} - \frac{1}{RSI} \quad \times \frac{DD \times 24 \text{ hrs} \times 3600 \text{ sec} \times \$/\text{litre}}{Eff \times MJ/L} = \$/m^2/yr$$

$$\frac{\$2.96}{\$\ .40/L} = 7.23\ L/m^2/yr$$

Option 3 & 4
Energy Saving

$$\frac{1}{2.1} - \frac{1}{7.0} \quad \frac{9050 \times 24 \times 3600 \times 0.41}{.80 \times 38.5 \times 10^6} = \qquad \$\ 3.45\ m^2/y\ Rd$$

$$\frac{\$3.45}{0.41/L} = 8.40\ L/m^2/yr\ Rd$$

Assumptions:

1. 9050 DD (20°C)
2. 38.5 MJ/L #1 Fuel Oil
3. Furnace Eff. 80%
4. Season Eff. Unchanged
5. Fuel Oil Cost $0.40/L and 0.41
6. Power Cost = $0.39/kW
7. Rd = Rounded (original calculations in English units, rounded metric equivalent units give slight discrepancy in answers)

Option #5 & #6
Energy Saving

$$\left(\frac{1}{0.3} - \frac{1}{0.5}\right) \frac{9050 \times 24 \times 3600 \times 0.41}{.80 \times 38.5 \times 10^{6}} = \quad \$12.90\ \text{m2/yr Rd}$$

Infiltration Reduction

0.8 m^3/hr to 0.4 m^3/hr/0.3 m = 5.2 m^3/hr/m^2

$$\frac{5.2 \times 1.23 \times 1000 \times 9050 \times 24 \times 0.41}{0.80 \times 38.5 \times 10^{6}} = \quad \$18.26/\text{m}^2/\text{yr}$$

Total $\overline{\$31.16}$/yr

Fuel Saving

$$\frac{\$31.16}{0.41} = 75\text{L/m}^2\text{/yr Rd}$$

Option 7
Energy Saving

$$\left(\frac{1}{.25} - \frac{1}{.60}\right) \frac{9050 \times 24 \times 3600 \times .41}{0.8 \times 38.5 \times 106} = \quad \$24.65\text{/yr Rd}$$

Fuel Saving

$$\frac{\$24.65}{0.41} = 60\ \text{L/yr}$$

Option #8
Energy Saving

$$14.62 \times 1.2 \times \frac{1000 \times 9050 \times 24 \times .41}{.80 \times 38.5 \times 106} = \quad \$50.73\text{/yr}$$

Fuel Saving

$$\frac{\$50.73}{0.41} = 123\ \text{L/yr}$$

Option #9
Energy Saving

$$\left(\frac{1}{.25} - \frac{1}{.60}\right) \frac{9050 \times 24 \times 3600 \times .41}{.80 \times 38.5 \times 106} = \qquad \$24.65/\text{yr}$$

$$3.8 \times \frac{100}{24} \times \frac{1.2 \times 1000 \times 9050 \times 24 \times .41}{.80 \times 38.5 \times 106} = \$54.79 \text{ Rd}$$

$$4.4 \times \frac{6}{7} = 3.8 \text{ m}^3/\text{person}$$

Total $79.44/yr

Fuel Saving

$$\frac{\$79.44}{0.41} = 193 \text{ L/yr}$$

Option #10
Energy Saving

Temperature set back 6^{o}C
Hours 12 hrs x 5 d = 60
24 hrs x 2 d = 48
108 hrs/wk setback time

$$\text{Percent of total time } \frac{108}{168} \times 100 = 65\%$$

Saving 6^{o} x 0.65 x 300 HD ÷ 9050 DD = 13% - 14%
(3.0 KW input)

$$\frac{30 \text{ KW} \times 300 \text{ HD} \times 24 \times 0.27 \text{ L.F.} \times 0.14 \times 3600 \times 0.41}{38.5 \times 106} =$$

$303/yr Rd

Fuel Saving

$$\frac{303}{0.41} = 747 \text{ L/yr Rd}$$

Unit Power Saving

350 W Fan & 107 W Burner @ 50% eff. = 915 Watts

$$300 \text{ HD} \times 24 \text{ hrs} \times .27 \text{ LF} \times .14 \times \frac{915}{1000} \times 0.39 = \qquad \$ 97/\text{yr Rd}$$

$$\text{Power Saving} \quad \frac{97}{0.39} = 247 \text{ KW/yr Rd}$$

Total Saving $400/yr

Option #11

Material Cost

164 Kg sheet metal x 2.20/Kg =	$360.00
4 Grills @ 20.00 each	$ 80.00
Total	$440.00

Labour Cost

$$\frac{40}{60} \times 440 = \quad \$300$$

Power Savings, 2-1500 KW heaters on 6 hours/day average (morning, noon , recess, afternoon)

$$\frac{6}{24} = 25\% \text{ of time}$$

$$0.24 \times \frac{3000}{55\text{oC}} \times 9050 \times 24 \times \frac{0.39 \quad - 0.047}{1000} = \$973 \text{ Rd}$$

(Elec - Oil Cost)

Option #12

Fuel Saving

Assumptions: 20% O/A
30% Furnace Duty
30 KW (input) unit

0.20 x 0.30 x 30 KW x 300 HD x 24 x $0.048 = $400/yr Rd

If on continuous outside air; 100% fan duty

3 x $400 = $1200/yr/furnace.

Option #13 & #14

Ventilation unit, 100% outside air shut off
(mixed air control Retrofits)
Saving, shut off 10-20% outside air during off hours (168 - 60 hrs); night duty, 30% x 125% (38%)

Energy Saving

$$0.20 \times \frac{108}{168} \times 0.38 \times 30 \text{ KW} \times 300 \text{ HD} \times 24 \times 0.048 = \quad \$502 \text{ Rd}$$

Fuel Saving

$\frac{502}{.41}$ = 1221 L/yr Rd

Power Saving

1/4 - 1/2 HP Fan @ 50-75% efficiency use,
1/3 HP @ 65% = 383 W

300 x 24 x .38 L.F. x $\frac{383\ W}{1000}$ x $0.39 = $409 Rd

Total Saving $911/ yr

Retrofit Costs Option #13

Materials	450
Labour	450
Total	$900

Retrofit Costs Option #14

Vent switch $200 + $900 = $1100/unit
+ O & P & Northern Allowance

Retrofit Option #15
Energy Saving

30 KW x 30% duty x 20% saving x 300 HD x 24 x $0.048 =

$575/yr Rd

Fuel Saving

$\frac{575}{.41}$ = 1398 L/yr Rd

Option #16
Energy Saving (per lamp)

11% x 46 watts x 50 hrs/wk x 40 wk* x $\frac{0.39}{1000}$ = $3.92/yr Rd

10 KW/yr power saving

Option #17
Energy Saving (per two lamp)

9 watts x 2 x 50 hrs/wk x 40 wks* x 0.39 = $14.10/yr

36 KW/y power saving

*mainly schools, other slightly higher.

Option #18
Energy Saving

$$(60 - 9)\text{ watts} \times 2000\text{ hrs/yr} \times \frac{0.39}{1000} = \quad \$40.00\text{/yr Rd}$$

Power Saving 102 KW/yr

Option #19
Energy Saving

$$(150 - 70)\text{watts} \times 2000\text{ hrs/yr} \times \frac{0.39}{1000} = \quad \$63.00\text{/yr Rd}$$

Power Saving 160 KW/yr

Option #20
Energy Saving (photo cell operation)

$$(100 - 41)\text{ watts} \times 3650\text{ hrs/yr} \times \frac{0.39}{1000} = \quad \$84.00\text{/yr Rd}$$

Power Saving 215 KW/yr

Option #21
Energy Savings (photo cell operation)

$$(150 - 55)\text{ watts} \times 3650\text{ hrs} \times \frac{0.39}{1000} = \quad \$135\text{/yr Rd}$$

Power Saving 347 KW/yr

Option #22
Energy Saving (photo cell Operation)

$$(250 - 50) \times 3650\text{ hrs} \times \frac{0.39}{1000} = \quad \$286\text{/yr Rd}$$

Power Saving 730 KW/yr

Option #23

Energy Saving

Load Factor 30%
Fan operating for 100% load factor
Saving with electric clutch 70 percent
Fan HP approximately 3% of Gen. Rating
For 100 KW unit

3 Kw x .7 x 24 x 365 = 18,396 KW/yr
@ 20% efficiency

$$\frac{18,396 \times 3411}{0.2 \text{ eff}} \times \frac{\$1.85}{165,000} = \$3517/\text{yr}$$

Fuel Saving

$$\frac{3517}{.40} = 8670 \text{ L/yr Rd}$$

ABBREVIATIONS

BEPI	Building Energy Performance Index in MJ/m^2
C	Calculated
°C	Degree Centigrade
CEAP	Canada Energy Audit Program
DD	Degree Days
E/A	Exhaust Air
Eff	Efficiency
E.F.F.	Energy Form Factor, losses including combustion and seasonal losses
GJ	Giga joule
hrs	hours
KW	Kilowatts
L	litres
L.F.	Load Factor
LR	Living Room
MJ/m^2	Mega joules per square meter
m	meters
NF	Northern Factor
NRC	National Research Council
O/A	Outside Air
O & P	Overhead & Profit
R	Resistance 1h.ft^{2}F/Btu
Rsi	Resistance m^2 K W-1
R/A	Return Air
Rd	Rounded
S/A	Supply Air
Sec	Seconds
<T	Greater than T
>T	Less than T
W	Watt
yrs or Y	years
Stat	Thermostat